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## EDITORIAL.

WE TAKE PLEASURE in noting that Mr. William Frecheville has been chosen president of the Institution of Mining and Metallurgy, London, in succession to Mr. Hennen Jennings, who has held this honorable office for the past two years.

MR. GEORGE LANSELL, the distinguished and public-spirited mine owner of Bendigo, Australia, attained his eighty-first birthday recently, amid the good-will of many friends in Australia and elsewhere. Mr. Lansell is the owner of the 180 mine, long celebrated as being the deepest gold mine in the world. It has lately been passed by its neighbor, the Victoria Quartz, which is 4,029 ft. deep, as against the 3,350 ft. of the old 180 shaft.

BY DOUBLING its October quarterly dividend, making a new record at 16 per cent per annum on par value, the Alaska Treadwell mine has paid in less than 15 years a total of 111.5 per cent on a capitalization of $5,000,000. To win these large profits from ore that assayed only $1.88 to $3.49 gold per ton shows excellent mine management.

ON ANOTHER PAGE we publish a list of the awards made by the juries in the Department of Mining and Metallurgy at the Louisiana Purchase Exposition. The list, we believe, is complete so far as the United States exhibitors are concerned, but not quite full as regards the foreign exhibits. The awards, while given as a matter of general interest, do not call for any special comment. Probably most of our readers who have visited the Exposition will be inclined to approve the awards, as just and, in the main, correct.

WE HAVE ALREADY noted in the JOURNAL the fact that there have been considerable purchases of copper in this market for Chinese account. This buying has continued, and the total must now reach a very respectable amount. In some quarters it is said to be as much as 10,000 tons, but this seems to be an exaggerated estimate. At any rate, the quantity has been sufficient to exert a material effect in supporting quotations. It is surmised that a considerable part of this is intended for the manufacture of cartridges and other war material,

as the development of electrical enterprises in China is not rapid enough to require large quantities of metal at the present time. The Chinese imports of copper have usually been from Japan, and these have been cut off in consequence of the war. There seems to be, however, an unusual demand at the present time, as the purchases here and in Australia have been much larger than would be needed to make up for the Japanese shortage. China is a new customer for our copper, at least so far as direct buying is concerned.

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The Council of the Institution of Mining and Metallurgy, London, at a recent meeting, adopted the following resolution: "That no member, associate, or student of the Institution of Mining and Metallurgy shall make use of the discussion on papers or other subjects at the meetings of the Institution, in prospectuses or any other documents published in connection with commercial undertakings, without the written authority of the Council, and of each individual speaker or writer concerned, previously obtained." The infraction of this resolution is to be regarded as justifying the expulsion of a member. It is further recommended that members should insist upon their reports and other documents connected with commercial undertakings, whenever published, being distinctly dated, being published *in extenso*, or if summarized, the summary to be approved and signed by the member concerned. We commend this decision and trust that the recommendations will be put into effect. The action of the Council bears upon a matter which we intend to discuss at greater length on a more convenient occasion.

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The retirement of Dr. Nelson P. Hulst from his position as vice-president of the Oliver Iron Mining Company, which will take place on January 1, will remove from active work a man who has been prominent in the development of the Lake Superior iron region, although we hope that he may be able to do good work for a long time to come. Dr. Hulst has long been known as a geologist. Many years ago he was one of the first to recognize the importance of the deposits of the Menominee iron range, and he was connected closely with its development. Soon after the Carnegie and Oliver interests realized the idea of operation of mines directly by the steel interests, and formed the Oliver Iron Mining Company, he was made general manager of the company, and when that concern was transferred to the United States Steel Corporation he was made vice-president, and was put in charge of his favorite work, that of geology and exploration. He was the discoverer of the Pewabic mine, at Iron Mountain, and always had an active official connection with the company. He was connected with many other mining companies, and was one of the founders of the Lake Superior Mining Institute, in which he took an active interest. Dr. Hulst has always been a student, notwithstanding the pressure of his active work, and few men are better acquainted with the geology of the iron ranges around Lake Superior. It is understood that he retires partly for the purpose of devoting some time to further study and exploration, and partly to attend to his private interests.

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## THE IRON AND STEEL INSTITUTE.

The opening proceedings of the New York meeting of the British Iron and Steel Institute, on Monday evening, at Sherry's, did not lack interest. Mr. Carnegie evidently appreciated his dual part as an American host welcoming the English visitors, and as the president of a British institute expressing thanks for American courtesy; in fact, he has that touch of humor which makes the whole world kin. And it was this feeling of kinship, as between the Anglo-Celtic nations, as between fellow workers in a great industry, as between white men, which was the dominant note of all the speeches. Exchange of experience and the noble barter of knowledge are the motive that impels these visits from one side of the Atlantic to the other. When, fourteen years ago, the Institute made its first official visit to America, the members were promised by Mr. Carnegie, speaking for his fellow craftsmen, the unrestrained entry into every mining and metallurgical plant and the free gift of any information required. Sir James Kitson, the president of that year, has recorded in behalf of the Institute that this undertaking was amply fulfilled. It was the policy of the 'open door,' carried out not with that cynical humor which demands free entrance to every Chinese port, and then debars the Chinaman, as though a leper, from landing upon these shores, but with the sincerity of Science. And in meeting the Englishmen in this spirit, our men of iron and steel recognized fittingly their own great obligations to the inventive genius of Cort and Nelson, Gilchrist and Thomas, Siemens and Bessemer. These men developed epoch-making metallurgical processes, the transcendent value of which was emphasized a hundredfold by the application and mechanical development of them in the fast-growing industries of the United States. The American has been keen to appreciate valuable ideas and quick to apply them; foremost of all has been the canny Scotchman, who, like his countrymen, "keeps the Sabbath and anything else that he can lay his hands upon," as he himself expressed it. And, after all, this fulfilment of knowledge, this broad-gauge utilization of technical science, is it not in itself as splendid as the inventive genius that furnishes the foundation upon which the many-storied structure is erected?

If Mr. Carnegie is Scotch by birth and American by process of law, it is certain that he is also American to his finger-tips in spirit, by the evidence of his appreciation of business principles. Sir James Kitson told the story of being taken through one of the Pittsburg works by Mr. Carnegie, and, asking him whether he understood the details of the machinery they were then inspecting, "No," the answer came, "but I understand the human machine." On Monday evening the distinguished man who said this repeated his former wish that his epitaph should read, "Here lies one who knew how to get round him men cleverer than himself." And if he *got around* men cleverer than himself at the same time, we can at least admire his fundamental appreciation of the fact that the cordial co-operation of fellow workers is essential to the success of great industrial enterprises.

We do not know what impressions our English friends will carry home with them; they may feel as other visitors have felt, that it would be easier to express admiration over the achievements of their hosts, if the latter did not anticipate compliment by self-congratulation. It certainly robs appreciation of its *fine fleur*. But makers of iron and steel need no accentuated laudation of the wonderful strides which the industry has made; more eloquent than statistics and more convincing than rhetoric is the object lesson of New York city herself.

Fourteen years ago, when the incoming steamer brought the members of the Institute into the quiet waters of New York harbor, the first sight of the city was the gilded dome of the *World* building, and then, above lower Broadway, Trinity church-spire came to view. When Huxley came up the bay he said that while the incoming traveler to other ports usually first saw the tops of church steeples, on reaching America the first thing in sight was a newspaper office. And it was typical of the community amid which he was about to land; not but that most of us are glad that other influences more creditable than those represented by such a paper as the *World* now find suggestion in the lofty buildings which, like a Titan's stronghold, are silhouetted against the sky as the traveler approaches New York from seaward. For, higher than the building of a corrupting newspaper or the spire of a beautiful church, there looms against the sky to-day the giant skeleton of a building which, in size, in material and in design, typifies to the full the steel industry of America. Any Englishman, or even a foreigner, who catches sight of the tall tracery of Trinity building, with its interlacing of steel girders and its veneer of sculptured stone will appreciate what an impetus has been given to the iron industry by the general use of structural steel in building construction. As he observes how the stone facing is being placed upon the metal-work twenty-five stories high, he will see that this operation is proceeding not only from the ground up, but from the twelfth story also, in order that the rate of progress may be doubled and the interest on the capital invested forthcoming

at the earliest possible date. A steel building twenty-five stories high, able to house the population of a village, and earning a rental of $20,000 per annum per floor, is measurable in the two units—feet and dollars—which easiest impress the human mind, and though the gigantic structure towers over quiet Trinity churchyard and overtops its graceful spire, is there not a touch of lingering sentiment in the ecclesiastical tone given to the architectural front of a building which looks over churches, newspaper offices and warehouses alike, to tell the incoming Briton that Bessemer and his peers builded better than they knew when they invented a metallurgical process which has won from the earth a wealth greater than the national debt of the United States?

## CERTIFICATES FOR ANTHRACITE MINERS.

The Pennsylvania laws governing the operation of coal mines, more particularly anthracite mines, are a curious mixture of the exact and the inexact, of specific directions intended to minimize the danger from all manner of accidents and of general provisions so poorly worded that literal compliance with them is impossible. In addition, while the bulk of the various mandates were probably intended to effect their nominal purposes, acts of another sort have been passed by the legislature, which, apparently aiming at the general good, were really intended for a quite different object. In this class are to be placed several amendments to the mining law of 1891 that have been passed through the political influence, real or supposed, of the labor unions in the anthracite region. One of these was the act making the office of mine inspector elective, and subdividing the mining districts in an illogical way; another, now under discussion, regulated the issuing of certificates to qualified miners, and forbade the employment of miners without certificates. This act supplanted an act of 1889 providing for the examination of miners by duly authorized examining boards.

The new act, which, it may be noted, was passed when the United Mine Workers were beginning to build up their membership in the anthracite region, that is, in 1897, had as its nominal object the protection of men from the dangers resulting from incompetent miners. It provided for the appointment of examining boards in each of the eight anthracite districts created by the act of 1891, required each miner working to appear at some designated place within his district and register, forbade the employment of men not registered, and gave the boards power to issue certificates of competency to those duly examined.

On the face of the case, none of these provisions is in any way prejudicial to the best interest of the State, but two clauses which plainly had quite another intent are these: All persons applying for a certificate of competency must present satisfactory evidence of having had not less than two years' practical experience as a miner or mine laborer in the mines of the State; must answer correctly at least twelve questions in English relating to the requirements of a practical miner, and be identified.

These provisions, it will be seen, amount simply to the requirement of two years' employment in the mines of the State, since the answering of at least twelve questions in English is a pure formality if the board be inclined, for any reason, to pass the applicant. Also, it should be noted that the clause does not require two years' experience at coal mines; experience at an iron mine or at a clay mine will do just as well. Consequently, the title of the act is a misnomer, and its real intent is to place the power to issue certificates or to register miners in certain hands, and to make it impossible for any person not a resident of the State for two years to get employment as a miner in an anthracite mine. The practical results of the act were seen in the strikes of 1900 and 1902, when the Mine Workers had gained control of the examining boards, and the anthracite operators were unable to import men from other States to mine coal.

Such an act is liable to cause abuses; it is common report that there has been the greatest laxity in the issue of miners' certificates by the examining boards. All the requirements of competency, if the words of the miners themselves are to be trusted, have been ignored or evaded, and foreigners unable to speak English, and utterly lacking necessary knowledge, have secured certificates by purchase.

One curious result is that a Pennsylvania iron miner, entirely ignorant of the dangers peculiar to coal mining, can register and get a certificate of competency to mine anthracite, while a bituminous miner from another State, with years of experience, is debarred until he has had two years' experience in Pennsylvania. In contrast, a rockman who has worked in tunnels, slopes and shafts, and may be an excellent miner, cannot mine coal, but can work at anthracite mines without registry, and can come directly from another State to work. The clauses relating to competency thus pertain simply to the man who breaks down the coal, and the miners' certificate act is evidently far from being a certain means of insuring protection to life and property.

How the Pennsylvania legislature came to pass such an act remains something of a mystery, for the devious ways of politics in Pennsylvania are not easy to understand. The great corporations most vitally interested were supposed to have men guarding their affairs at Harrisburg; evidently those who were expected to be on the lookout failed to realize the importance of the two years' residence clause, and did not foresee the growth of the power of the United Mine Workers.

The act is now before the courts and its constitutionality is to be tested. One John Shaleen, who was not a resident of Pennsylvania, but had an experience of over two years in coal mining in Illinois, was recently arrested near Scranton for having worked at an anthracite mine without having secured a certificate or having registered. One of the large anthracite mining companies was instrumental in having Shaleen arrested, wishing to have the constitutionality of the law decided. A jury returned a special verdict setting forth that there is no material difference in the methods of mining coal in the bituminous mines of Pennsylvania and of other States, and that the duties of a miner in the bituminous mines of one of those States would as fully qualify a person for working in an anthracite mine as would employment at a Pennsylvania bituminous mine, iron mine or zinc mine. This verdict is only a formal one, given so that the legal questions involved can be brought before the higher courts, which will decide whether or not the law is, in effect, class legislation, or whether it is unconstitutional, as interfering with the rights of citizens of other States to pursue their occupations in Pennsylvania.

## DRY AIR FOR BLAST FURNACES.

The paper read by Mr. James Gayley before the Iron and Steel Institute this week, an abstract of which is given on another page, gives a full and clear account of an exceedingly important series of experiments. It is not too much to say that the dry-air blast, which Mr. Gayley has been testing, is the most important step in iron metallurgy, and in the reduction of the costs of blast-furnace operation, since the utilization of the waste gases from the furnace was tried in Germany and Belgium several years ago. How important it might be has not, we think, been fully realized. It is true that some metallurgists, as Mr. Gayley says, have referred to the subject theoretically; and Dr. Wm. B. Phillips predicted several years ago that drying the blast would probably be the next advance in blast-furnace economy. But it is one thing to argue from theory and another to reduce to practice; and Mr. Gayley deserves all the credit of being the first to devise the methods of carrying out this improvement and putting it into practical use and service.

It must be remembered also that any change in the blast furnace cannot be demonstrated as practical or important by theoretical calculation or laboratory experiments. It must be tried on a large scale, involving a heavy expense; and it requires courage and conviction to work it out, as well as long experience and thorough knowledge of the furnace. In this case, fortunately, all these requisites were found. Mr. Gayley deserves thanks, not only for the admirable work he has done, but also for the full and clear exposition he has made for the benefit of his professional brethren.

## THE IRON AND STEEL INSTITUTE.

By R. W. RAYMOND.

We give below the full text of the speech made by Dr. R. W. Raymond in offering the toast of "The Iron and Steel Institute" at the banquet of the Institute, at the Waldorf-Astoria, October 26:

MR. PRESIDENT AND GENTLEMEN:

In the discharge of the honorable duty assigned to me on this occasion, I am both stimulated and embarrassed by the circumstance that I have recently received one of the highest distinctions to which one of my profession could aspire, namely, an unsolicited, unexpected and unanimous election as Honorary Member of the Iron and Steel Institute. The addition of my name to a small list, headed by that of the King of England (may God bless him, as God blessed his sainted mother, to be a potent factor in the peace and progress of the world), and comprising those of some of the greatest leaders in what is, perhaps, the most important department of scientific and industrial advance affecting the welfare of mankind, might well be supposed to warp my judgment concerning the illustrious companionship to which I have thus been admitted. Permit me, nevertheless, to speak to-night from that standpoint of a disinterested observer, which I have until lately occupied, and which, I fancy, I can still, through force of habit, resume.

The Iron and Steel Institute was organized in 1869. Thirty-five years is a small period to compass such a career and to deserve and win such world-wide recognition as this society has achieved. At the inaugural meeting, held in London, June 23, 1869, its first president, the Duke of Devonshire, whose intelligent interest and responsible participation in the British iron manufacture, not less than his official connection with the ancient University of Cambridge, reflected new luster upon his ancestral rank, delivered an admirable address, sketching the history of the manufacture of iron, noting the steps of its progress, and indicating its situation throughout the world.

That address illustrates the manner in which great scientific improvements produce their revolutionary results. Not at the date of the invention of the steam-engine, the puddling-furnace, the rolling-mill, the bessemer converter, the open-hearth furnace, the railroad or the telegraph, did either of these exhibit its full effect upon the world. At a later period, when improved furnaces and mills had combined to make machinery good and cheap and common; when railroads had enmeshed all civilized States, and steel rails had brought together producers and consumers ("Whom God hath joined together, let no man put asunder;" but whom God hath put asunder, it is His will that man should bring together); when ocean cables—not one or two, but a hundred, and ocean steamers by the thousand, had superseded the cumbrous commercial systems of two hemispheres; when swift intercommunication and free trade in ideas had made each forward step of improvement the immediate property of all the world, then it was that the combined effect of all these agencies became evident, with a suddenness and power which puzzled the political economist, worried the statesman, and temporarily disarranged, while it ultimately and speedily reconstructed in new power, the industries of men. Sir Samuel Baker found the fertilizing flood of the Nile to be the result of a thousand small freshets in the mountains of Abyssinia, the confluence of which filled the channels of a hundred creeks, which in turn flooded the tributaries of the Atbara, until at last, far from the sources which had fed its waters, the Blue Nile came down, in a wall of water twelve feet high, to cover and to fructify for a thousand miles the land of Egypt. So new knowledge is distilled from heaven into a thousand souls; so they combine to fill and overflow the ancient channels of human intercourse; so they constitute at last the deluge, out of which emerges a new world.

Now, the beginnings of such a beneficent cataclysm fell very near the year 1869. The address of the Duke of Devonshire recognizes as already in use and likely to become widely important, the large blast furnace, the brick stove for heating the blast, the bessemer converter, the open-hearth steel process, the general substitution of rolls for hammers, Whitworth's casting of steel under compression, together with some other inventions, which afterwards more or less disappointed the expectations then entertained concerning them. Moreover, with singular acuteness, it calls attention to the unfavorable effect of the relatively low density and high humidity of the air blown into the blast furnace during warm weather, an evil which, by a happy coincidence, is to receive its latest discussion and its first effective remedy through the paper of Mr. Gayley at this meeting of the Institute.

But neither the Duke of Devonshire nor any one else realized the extent of the flood which was to come from the springs he noted. At the time of his address the world's production of pig iron was, in round numbers, twelve million tons, of which Great Britain produced something less than half; the United States, Germany and France about one-eighth each, and the rest of the world the remainder, a little more than one-eighth. Last year the world produced nearly forty-seven million tons of pig iron, of which Great Britain, though she had increased her output 63 per cent, furnished not quite one-fifth, while the United States, with an increase of more than 900 per cent, contributed much more than one-third, and Germany something more than one-fifth, an increase of 613 per cent. Now, it was in Great Britain that most of the factors of this progress originated, and it is evident that the grand result, like the rise of the Nile, has been exhibited far from its original sources.

I have said that no one realized in 1869 the extent of this coming flood. But justice requires that I should call attention to the remarkable prescience shown a little later by Abram S. Hewitt, whom the Institute honored in 1890 with the Bessemer medal. In an address of welcome to the American Institute of Mining Engineers, delivered in this city in May, 1872, Mr. Hewitt prophesied that in 1890 the world's product of pig iron would be twenty-eight million tons—it was 27,630,000 tons; that it would be at the beginning of the twentieth century more than forty million tons—it was 40,499,786 tons; that the product of the United States in 1897 would be ten million tons—it was 9,652,680 tons; and that the annual product of this country at the beginning of the twentieth century would be fifteen million tons—it was 14,960,000 tons. I venture to say that our theological friends, if they could produce such a verification of the declarations of an Old Testament prophet, would deem it conclusive proof of divine inspiration. To me it is a proof that, even outside of the biblical list, the divine power, through the operation of the laws it has ordained, may grant to a pure, lofty, disinterested and reverently and profoundly inquiring spirit the ability to read the future.

Far be it from me to boast of the extraordinary progress of my country in this field. In the first place, that progress has been chiefly based upon virgin resources, for the possession of which we can claim no credit. It was totally without knowledge of the future value of the Lake Superior iron ore deposits that the boundary line between us and Canada was so drawn as to give us almost all of those deposits, upon which our vast iron industry now so largely depends. In the second place, if I were inclined to boast, I should be checked by the reflection that one of the chief agents in the extraordinary development of the American iron and steel business has been that cosmopolitan captain of industry, now president of the Iron and Steel Institute, Mr. Andrew Carnegie, whose merits and achievements have just been recognized by the conferment of the Bessemer gold medal, to my mind one of the greatest distinctions which human hands can place upon a human breast, and by the election of whom as its executive officer the Institute has declared that its labors and its rewards are not limited by political boundaries. And, finally, I must bear witness, for every one of the students and practitioners who have contributed during the last thirty-five years to the development of the iron and steel industry of the United States, that they have always looked to the Iron and Steel Institute for sympathetic and helpful criticism, guidance and inspiration. Whatever success we have achieved may justly be added as a jewel to the crown of fame which that society has fairly earned and may proudly wear.

In that priceless Volume I of the *Journal* which I have cited, the first technical contribution is a paper by Isaac Lowthian Bell 'On the Development of Heat and Its Appropriation in Blast Furnaces of Different Dimensions.' I need not say what a profound effect that paper, with its successors, produced upon the metallurgists of the world. To this day no man is competent to write upon the interior reactions of the iron blast furnace who has not first mastered the classic discussion of that subject by Sir Lowthian Bell. Not only to me as an ardent and grateful personal friend, but also to every one of you, it must be cause for gratitude that this far-seeing, undaunted, wise and generous pioneer and teacher is still preserved to us, in mental powers unimpaired by age, as it is cause for regret that we cannot see once more among us, as so often heretofore, his benign and noble face.

But I cannot inflict upon you at this time a detailed account of the varied and effective labors of this society. I might fairly apply to it, in substance, the famous epitaph of Johnson upon Goldsmith (only no *epitaph* would be appropriate to a career still so vigorous and fruitful), and say that there is no subject of importance to the sciences and art connected with iron and steel which the Institute has not treated, and that it has treated nothing which it has not adorned. In every step of that progress, the fruits of which we enjoy, it has taken an influential part. It is not the Iron and Steel Institute "of Great Britain"; it is The Iron and Steel Institute, representing us all!

Gentlemen, I offer the toast of "The Iron and Steel Institute," and I couple with this sentiment the name of Mr. Andrew Carnegie, its honored president.

## DRY AIR BLAST IN THE MANUFACTURE OF IRON.*

By JAMES GAYLEY.

The atmosphere, which plays such an important part in the manufacture of iron and steel, is the most variable element to contend with in its several processes; and particularly is this true of the blast-furnace process, which consumes air in large quantities. At no time since the blast furnace became an important and widely used apparatus—even when it was operated in the most crude manner—have the variations in composition of the raw materials used been as frequent and as great as the variations in humidity of the atmosphere. Great and important improvements have been made in the blast furnace and its accessories, as in the hot-blast stoves, the increase in size and change in the shape of the furnace, more efficient blowing engines, the increased protection given to the bosh walls, and in the careful preparation of the raw material, all of which have exerted a pronounced influence on the furnace operations from a metallurgical standpoint. During the past eight years but little advance has been made in this direction; the fuel consumption has not diminished, nor has there been any material increase in production. Within this period, however, there has been witnessed the greatest development in appliances for the economical handling of material, and so complete has been the work in this direction that, except in isolated cases, in this country at least, a further extension does not hold out much promise of a satisfactory return on the investment required. It seemed that, with the exception of the gas-engine, we had about reached the limit, for, like a strong wall, the atmosphere, with its humidity as variable today as when first blown into a primitive blast furnace, appeared to stand as a barrier to further progress. In furnaces using ore from the Lake Superior district, the raw material, amounting to about 7,200 lb. per ton of iron, varies in composition within 10 per cent, and is as uniform as human skill can make it; but the atmosphere, of which 11,700 lb. are consumed per ton of iron, varies in its content of moisture from 20 to 100 per cent from day to day, and often in the same day, thus rendering the process, even with the best appliances, an uncertain one and dependent on the caprice of the atmosphere.

The dessication of the air used in blast furnaces to such extent as to cause a practical elimination of the moisture, or its reduction to a small quantity, and maintaining it uniform, must of necessity contribute in a very marked degree toward the attainment of uniformity in the furnace operations, and the advantages from dessication can be appreciated only after due consideration is given to the volume of air that is consumed per minute and the large amount of moisture which it contains. Managers of blast furnaces are familiar with the chilling effects produced in the hearth by a tuyere that is leaking, which immediately results in a deterioration in the grade of the iron, and yet the quantity of water ordinarily entering the furnace under these conditions is not greatly in excess of the quantity carried in, like a steady stream, by the atmosphere during a period of the average humid conditions prevailing in the summer season in this country.

It has been deemed preferable in this communication to express the quantity of moisture contained in the atmosphere as grains of water per cubic foot of air, inasmuch as the quantity of air blown into blast furnaces is expressed in cubic feet. With air containing one grain of water per cubic foot, there is passed into the furnace, for each 1,000 cubic feet used per minute, practically one gallon of water per hour. The furnaces of average size in the Pittsburg district consume about 40,000 cubic feet of air per minute, which would pass into the furnace 40 gallons of water per hour for each grain of moisture contained in a cubic foot of air. The quantity of moisture in the air, taken from daily readings, varies from 2.8 grains per cubic foot to 7 grains. Similarly, observations taken at one of the furnaces in Pittsburg showed a variation from month to month, the average being lowest in February—2.7 grains of water per cubic foot of air—and highest in June—7.3 grains per cubic foot. The variations in moisture from month to month demonstrate clearly the conditions as to atmosphere with which blast furnaces in this country have had to contend. If these conditions were uniform throughout the whole month, it would not be a difficult problem to deal with; but unfortunately they are not uniform. Thus the moisture in the atmosphere in the month of January was much less than in July, yet the percentage of variation was greater. The changes are great not only from day to day, but from hour to hour in the same day, and often they are very abrupt. The records quoted were made at a furnace plant located on the bank of a river, where the conditions exist for an increase in humidity as compared with higher ground; and to what extent the abrupt changes may have been caused by the presence of steam in the atmosphere—absorbed from spraying of the hot pig beds, the blow-off from boilers and exhaust from engines, or from a rainstorm, when the humidity decreases suddenly—it is impossible to say. How frequently has it happened in the experience of every furnace manager, that the furnace has gradually or suddenly lost its hearth temperature, and produced a grade of iron either undesirable or unmarketable, without any visible cause. Tuyeres are examined for leaks, the raw material in the stockyard is carefully inspected, and usually the coke is condemned. A more intimate acquaintance with the atmosphere would have provided a correct and ready reason, for the variations therein are not only many times greater than in the raw material, but a greater weight of it is used per ton of iron.

It is true that the atmosphere has been recognized by many metallurgists as the cause of many and serious irregularities in blast-furnace operations, but it is doubtful if its influence has been adequately recognized. Many writers on metallurgical subjects have considered the moisture in the atmosphere, and calculated the absorption of heat necessary for its dissipation—and invariably underestimated; and have dismissed the subject with the conclusion that to extract the moisture the game was not worth the candle, or in a spirit of resignation accepted it—like storm and sunshine—as a condition beyond our control. This conclusion has no doubt been reached by a consideration alone of the quantity of fuel necessary to dissipate the moisture in the furnace hearth, based on observations of the humidity of the atmosphere taken outside the blowing-engine room, and this quantity, while important, does not indicate a great saving in fuel. Of much greater importance is the variation in moisture from time to time, and the margin of heat carried in the furnace to compensate for these variations, which margin is invariably large; and every furnace manager is aware of its existence, from the way in which he is required to manipulate the bot-blast temperatures, and from the silicon in the metal, which is the thermometer of the hearth.

It has often been a matter of surprise that a greater saving of fuel per ton of iron was not obtained in the winter, as compared with the summer season, as the records show a much less content of moisture in the atmosphere, the reason being that blowing-engines at blast furnaces do not receive air of the dryness shown in the meteorological record. In summer the windows and doors of the blowing-engine room are wide open, and the supply of air, with reference to humidity, is practically that of the atmosphere; but in winter they are nearly or quite closed, and the entering air has mixed with it all of the steam that leaks from the engine and is contaminated therewith. Records taken over a number of years show that there is not a very great difference in the moisture in atmosphere between observations taken outdoors in summer and in the engine-room in winter.

Comparisons of the data collected suggest that a great advantage could be derived by leading pipes from outdoors to the inlet-valves of the air-cylinder. So impressed was the writer with this conclusion that the blowing-engines at a furnace under his direction were so equipped. The excellent results expected in the summer season did not materialize, or rather were so slight, as compared with a companion furnace not so equipped, as to argue against any extension along that line. This experience suggested the conclusion that while the air in the engine-room was higher in its content of moisture, through its admixture with steam, than the outside air, yet it was not subject to the same variations; and, further, that these variations, which were often sudden and great, were really the most troublesome feature, and that nothing less than maintaining the atmosphere uniform with respect to humidity would prove of any material advantage. The saving in fuel through such uniformity could not be accurately set forth. The amount of fuel necessary for the decomposition of the moisture in the blast can be closely arrived at, but to what extent that which might be designated as the surplus of heat, utilized for counteracting the variations in moisture, could be diminished, must of necessity be an approximation, as there existed no tangible data for estimating it. Nevertheless, the saving therein was deemed to be considerable.

It may reasonably be assumed that in order to determine the most feasible method and apparatus for extracting the moisture, a wide field of experiment must be covered. Various schemes for absorbing the moisture were worked out and in turn abandoned, and refrigeration by means of anhydrous ammonia was chosen. After many preliminary experiments an insulated chamber containing coils of pipe, and of sufficient size to treat the air from a blowing cylinder 3 ft. in diameter, was built. A small ice-machine was installed to circulate the ammonia through the coils, and the air was admitted to the refrigerating chamber from an auxiliary chamber in which steam could be introduced at will, thus making it possible to treat, at any time, air containing the maximum amount of moisture with which it would be necessary to contend in the summer months. In this experimental plant air was treated under a variety of conditions for quite a period, and from the data obtained the equipment for a modern furnace was worked out.

*Abstract of paper read before the Iron and Steel Institute, New York, October 26, 1904

Isabella Furnace, of the Carnegie Steel Company, at Etna, Pa., was selected as the plant at which to instal the apparatus for applying the dry-air blast.

The lines and dimensions of this furnace are shown in Fig. 1, and represent the usual construction of furnaces in the Pittsburg district. The furnace is blown with twelve 6-in. tuyeres, and is equipped with four hot-blast stoves. Blast is supplied by three blowing-engines having steam cylinder, 44 in. diameter; air-cylinder, 84 in.; stroke, 60 in.

Fig. 2 shows in elevation the ammonia compressors, condensers, and the refrigerating chamber. This view of the refrigerating chamber shows it to be connected for the direct expansion of ammonia, but as the escape of ammonia gas through a broken pipe or leaking joint might imperil the life of anyone in the chamber at the time, it was decided to adopt the brine system, and the pipe connections are as shown in Fig. 3, representing the refrigerating chamber in end view. The refrigerating chamber is lined on the inside with plates of compressed cork 2 in. thick.

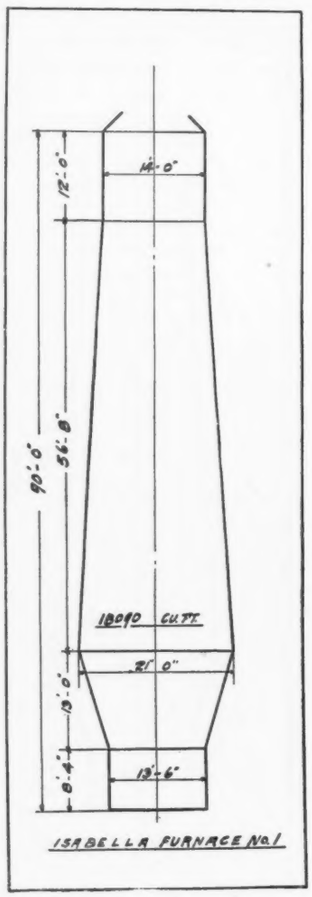


FIG. 1.

The ammonia machines are of the compressor type, and were built by the York Manufacturing Company, York, Pa. The diameter of the high-pressure steam-cylinder, 28.5 in.; low-pressure, 56 in.; compressor cylinder, 22.5 in.; stroke, 36 in. Two compressors were installed in order to have one in reserve at all times, as a furnace operating on uniformly dry air cannot be subjected to ordinary atmospheric conditions without serious results, and frequently on very humid days the assistance of the second engine might be required. Each compressor's capacity is 225 tons ice melting effect.

In the brine-tank are 20 coils of pipe, covered with calcium chloride brine having a sp. gr. of 1.21. The return brine from the refrigerating chamber flows into the top of the tank, is cooled by the ammonia expanding between the outer and inner pipes, withdrawn therefrom by a pump and forced back through a pipe into the 2-in. or inner pipes, where it is cooled below the freezing-point, and thence into the coils in the refrigerating chamber. The ammonia enters at the bottom of the pipes, thus traveling in the opposite direction from the brine, and by expanding between the 2-in. and 3-in. pipe cools the brine both in the tank and in the inner pipes. Forty thousand gallons of brine are required in the system.

Fig. 3 shows the arrangement of pipes in the refrigerating chamber. There are in each vertical line of coils 75 pipes 2 in. diameter and 20 ft. long, and in the chamber there are 60 vertical lines of coil, the whole representing 90,000 ft. of 2-in. pipe in the chamber. The pipes in each vertical coil are placed in staggered position to insure better contact with the air. The series of coils is divided into three sections and fed through a 4-in. header, and discharges into a 6-in. header, thence into a standpipe, from which the brine flows to the brine-tank, its feed being arranged to cause the brine to flow in a direction opposite to that of the air. As the space between the pipes would become gradually reduced through the accumulation of frost, which might diminish the efficiency of the blowing-engine, a blower was installed to force air into the refrigerating chamber, and in order to secure a uniform distribution of air over the coils, revolving electric fans were placed in the space underneath, so that all of the coils would frost alike. The entering air, according to its humidity, deposits the moisture in the form of water or frost on the lower pipes, and as frost only on the upper pipes, and passes from the top of the chamber to the blowing-engines at a temperature of freezing or below and with a practically uniform content of moisture. When the pipes become covered with frost the cold brine is shut off from several vertical lines of coil at a time, and through an auxiliary pump and line of pipe brine that has been heated in a tank with steam is forced through, and in a few minutes the frost is melted. Connection is then made with the cold-brine system, and frost begins to deposit quickly. The frost which has been melted off the pipes collects in a trough in the basement floor, from which it flows into the supply-tank for the condenser.

The dry-blast plant was put in operation August 11, 1904. The furnace was making a grade of iron suitable for the basic open-hearth furnace, containing less than 1 per cent silicon, with an ore mixture consisting of 50 per cent Mesabi ore, the balance being soft hematites from Michigan. The mixture showed a yield, by analysis, of 53.5 per cent iron. The coke used was shipped from two mines and contained on an average 10.5 per cent and 12.5 per cent of ash respectively, and also varied considerably in ash. In order to obtain correct data from the use of the dry-blast, it was determined before-hand that no changes in any particular were to be made in the operation of the furnace, other than the introduction of dry air, and this has been rigidly adhered to. In the data following a comparison is made between the operations of the furnace using dry air after August 11 and those from August 1 to 11, when the furnace was using the atmosphere under ordinary conditions. A comparison with the previous month would show a greater economy in coke, but since a change was made in the ore mixture in the latter part of July—which gave a lower coke consumption per ton of iron—a comparison of data when using dry air with that obtained in August prior to its use, and with the same ore mixture, would more accurately show the benefits derived. The burden on the furnace from August 1 to 11 inclusive was 10,200 lb. coke, 20,000 lb. ore and 5,000 lb. stone. On August 11 a 5 per cent increase in burden was put on the furnace and later in the day 33 per cent of dry-blast was used. As soon as this small quantity was introduced its effect was noticeable by a brightening of the tuyers and an increasing temper-

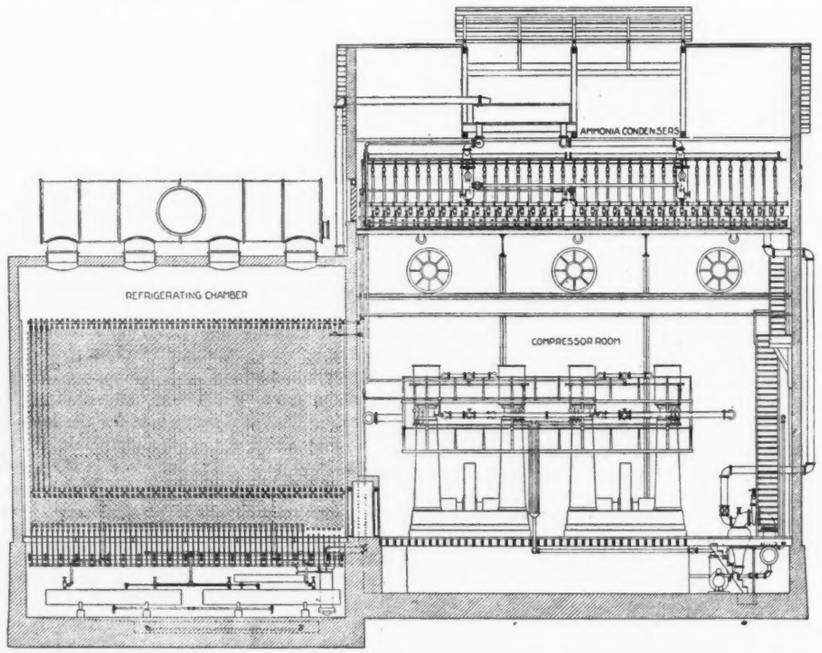


FIG. 2.—SECTION OF REFRIGERATING PLANT.

ature of the cinder. After this change in burden had come to work and the condition of the furnace showing, if anything, more satisfactory, an additional 5 per cent of burden was put on with confidence, feeling assured that an increased use of dry-blast would offset the increased duty on the furnace. From this period on the burden and volume of dry-blast were increased more slowly, until, on August 25, the furnace, using dry-blast entirely, had the following burden at work: Coke, 10,200 lb.; ore, 24,000 lb.; stone, 6,000 lb.; thus in two weeks obtaining an increase in burden of 20 per cent. The record of the furnace from August 1 to 11, prior to the use of the dry-blast, shows an average daily production of 358 tons of iron, with an average consumption of 2,147 lb. coke. From August 25 to September 9 the average output was 447 tons iron, with a consumption of 1,726 lb. coke per ton.

The effect of reducing and making more uniform the moisture in the blast was clearly shown when, during a period of excessive humidity extending over three days, a neighboring furnace charged during this period an extra quantity of coke and increased the quantity each day in order to maintain the grade of iron, while the Isabella furnace, operating on dry-blast, was in no wise affected.

In order to show what changes have been made in the atmosphere by passing it through a refrigerating chamber, the following daily records of operations will give a clear idea: During a period of 13 days the average moisture in the atmosphere was 5.66 grains per cu. ft. and in the dry air 1.75 grains. Sixty-nine pounds of water were removed from the blast per ton of iron produced, which represents an average of 23,192 lb. (equivalent to 2,874 gal.) for the 24 hours. This weight was calculated from the volume of air blown into the furnace, as shown by piston displacement. For four days during the above period the water caught in the tank underneath the refrigerating chamber amounted to an average of 21,561 lb. (equivalent to 2,588 gal.) for the 24 hours, which is as close an agreement as could be expected, considering that the figures do not represent the same number of days, and the difficulty in accurately determining the volume and humidity of the air supplied in a given period. It is found sufficient in practice to thaw the frost off the pipes every three days. The coils are divided, for the purpose of thawing off, into three sections, each representing the same number of coils, and a section is thawed each day, and in this way the work of refrigeration is not interfered with.

As the dry-blast was supplied to the furnace it became necessary to reduce the revolutions of the blowing-engines, since the air supplied to the engines was lower in temperature than with the natural atmosphere and contained more oxygen per cu. ft., and the tendency of the furnace was to drive too fast. Before applying the dry-blast the engines were running at 114 revolutions and supplying 40,000 cu. ft. of air per minute; the revolutions were gradually reduced to 96, thereby reducing the volume of blast over 6,000 cu. ft. per minute and increasing the efficiency of the engines by 14 per cent. With dried blast, 96 revolutions per minute of the blowing-engines burned nearly 1 per cent more coke and produced 89 tons more pig-iron in 24 hours than 114 revolutions on natural air. The reduction in the revolutions resulted in a gain of 150° in temperature of the blast, which even with this increase, through lack of area in the waste-gas ports of the stove, did not average above 870°.

The average analysis of the gas for 10 days prior to the introduction of the dry-blast showed CO, 22.3 per cent; $CO_2$, 13 per cent, with an average temperature of 538°. Later, with dry-blast used entirely, the average analysis was CO, 19.9 per cent; $CO_2$, 16 per cent, with an average temperature of 376°. This reduction in temperature of 162° is a necessary consequence of the greater concentration of heat in the hearth by the dry-blast combustion and the greater weight of burden heated by the gas, and represents an important saving of heat in the furnace.

The use of the dry-blast has resulted in economies in several other directions. With the use of Mesabi ore, which is very fine in structure, the waste of ore dust through the escaping gases is quite large, and at many furnaces the waste in ore has become quite burdensome. The waste at Isabella furnace before dry-blast was used amounted to 5 per cent of the ore charged; this has been reduced, through the greater uniformity in the furnace working, to less than 1 per cent.

The saving in coke consumption reduces the phosphorus in the metal, and this, in making bessemer iron, permits the use of higher phosphorus ores. As Isabella furnace was making basic iron, it was of advantage to keep the silicon as low as possible, providing the sulphur was kept low, and the absence of irregularities in the furnace operations resulting from the dry-blast permitted the keeping of the silicon at a lower range without increasing the sulphur. It has been generally observed by furnace managers that when the silicon is lowered through increased humidity in the atmosphere, a leaking tuyere, or through other causes, the sulphur is rapidly increased; but it has been found in using the dry-blast that when the hearth temperature was suddenly lowered, principally from the accretions on the bosh reaching the hearth, the sulphur did not increase, and in this respect the furnace has shown a remarkable uniformity in composition of the metal produced.

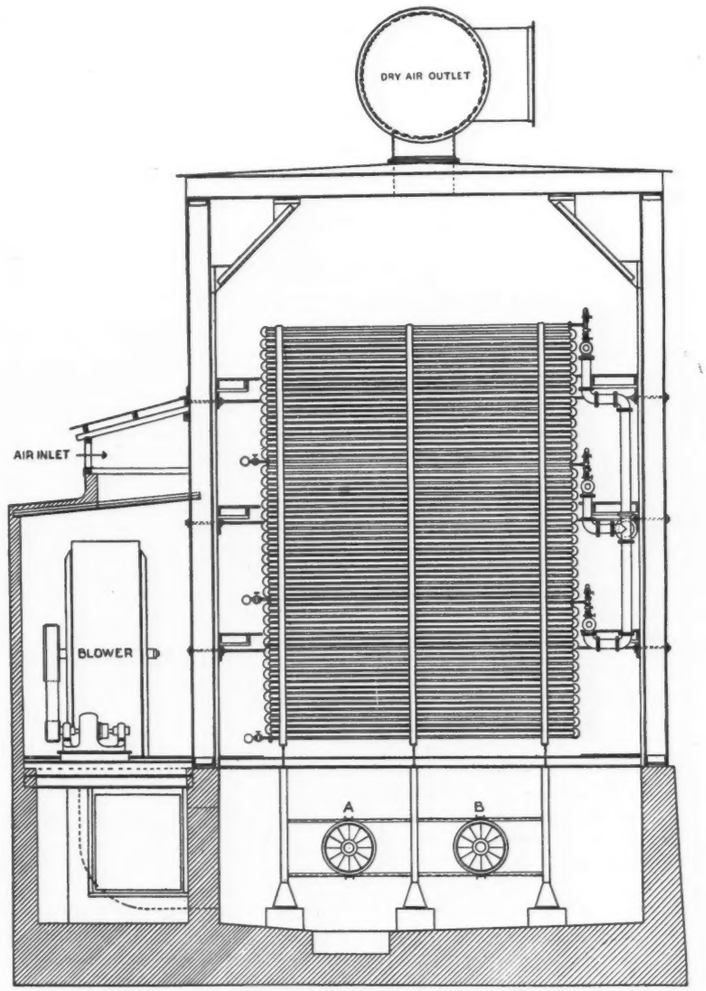


FIG. 3.—REFRIGERATING CHAMBER.

Mention has been made of the saving effected in the blowing-engines through a reduction in the number of the revolutions, and this saving has an important bearing on the expenditure for power in operating the machines in the dry-blast plant. From indicator cards taken at different times, it appeared that the saving in power when using dry-blast was 229 h.p. for each engine, or 687 h.p. in all. The drying plant required 535 h.p., or less than the saving on the blast engines. These figures, however, may not represent accurately the difference in power consumption, as the blowing-engines were indicated at different times and the first test was taken with a blast pressure on the furnace of 17 lb., while the test made with the

dry-blast was 15 lb., and the figures given above might require some modification, as the effect of dry-blast on blast pressure is not yet fully determined. The increase of uniformity in the working of the furnace, which is obtained through the dry-blast, would result in a decrease in the blast pressure, and it would appear in any event that the saving in power consumption in the blowing-engine room would nearly or quite compensate for the requirements at the dry-blast plant.

The application of the dry-blast to the blast-furnace has shown, in addition to the economies effected, that the furnace can be operated with precision; it works with greater regularity, and in consequence the product is uniform with respect to grade and composition, which makes the dry-blast of particular value in the making of foundry iron, which is marketed by grade. An increase or decrease in blast temperature has a definite effect and can be relied on to accomplish the desired result.

The dry-blast plant, since it was started on August 11, has been in regular operation. It started without a hitch, and no difficulties have developed in any direction. Some modification in construction has been indicated as the result of the operation of the plant which would further reduce the moisture and add to its uniformity, but so far the changes suggested have been slight.

While the application of the dry-blast to the blast furnace has effected various economies and produced a more uniform metal, its further application to the bessemer converter would no doubt result in great benefit, since air is used in large quantities and the varying humidity affects the temperature of the charge and in consequence the quality of the steel. The metal from the metal-mixer is remarkably uniform, and the additional uniformity secured through the use of dry air would be of further advantage. It happens that a higher silicon is required in the summer months to maintain the temperature of the blow, in which period it is also more expensive to maintain the right amount of silicon in the pig-iron. With the use of the dry-blast in the converter the proper temperature could be secured with a lower silicon in the metal, and this in turn would further reduce the coke consumption at the furnaces. In other processes where air is used in large quantities—particularly in smelters and copper converters and in the open-hearth furnace and in cupolas—it would appear that the use of dry air would effect important economies.

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STATE COAL MINES IN VENEZUELA.—The British Minister at Caracas reports the issue of a decree on August 20 to the effect that all deposits of coal now existing in Venezuela will, in future, be exploited by the Federal Executive. The decree respects the rights already acquired by previous concessionnaires.

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THE FRENCH IRON ORE TRADE.—To the end of August last only 1,134,034 tons of foreign iron ore had been imported this year into France, as compared with 1,243,478 tons in the corresponding eight months of 1903. Of the total this year, 787,629 tons came from Germany, 248,260 tons from Spain, and 39,955 tons from Algeria. The exports of French ore during the eight months ending with August last are returned at 830,505 tons, as contrasted with 453,149 tons in the corresponding eight months of last year.

# DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

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GOLD MINING IN SIBERIA.

*The Editor:*

Sir—In your issue dated September 15 I notice that you have reprinted an article on 'Gold Mining in Siberia,' published in *The Economist* of the 27th ultimo.

I have already written to the paper which published this extremely misleading article—an article confessedly based upon a most superficial observation.

I must demur to the conclusion formed by your contributor, that there is not much chance for English capital in Siberia; and I do so on the grounds of experience, gained by actual work in the country. By his own admission your contributor bases his arguments on data collected in his visits to Siberian mines during the present year—let us say, eight months' work; I have known the country intimately for as many years.

To take the various points seriatim:

1. *Racial Conditions.*—The Russian language is certainly a difficulty, but it is not insuperable. Two of my engineers at a quartz mine in Trans-Baikalia learned enough in six weeks to enable them to handle the workmen satisfactorily, and after six months were able to transact all the business of the company without any assistance, except in the keeping of the books required by the Russian Government, which are complicated and technical. I could quote several other almost parallel cases.

I do not agree that the Russian temperament is such an enigma as your contributor would represent. That it lacks the "peculiar energy" inherent in the English-speaking races is true, but at the mine I have already cited the labor conditions before the outbreak of the war were not such as to "make all the difference between success and failure."

The Russian is not extremely conservative. Miners learn very quickly to become efficient, and it only needs tact and supervision to make good workers of a considerable percentage of them.

Reliable Russians can be selected to assist in carrying on the work and administration. The position of foreman is much sought after, and great personal interest is taken in the mine. The labor difficulty is far from insurmountable, even without Chinese labor, which is easily obtained if necessary, especially east of Lake Baikal.

2. *Political conditions* are hard in theory, but in practice have been found to possess an adaptability which is decidedly encouraging to foreign capitalists. An agency in St. Petersburg is essential, but its upkeep is not disproportionate, and compares with the cost of similar agencies in Africa, Australia and elsewhere.

3. *Dynamite.*—The case your correspondent mentions occurred in the prospecting, and not the working, stages of the mine. When one can show the government that a certain quantity of dynamite is required, and that there is proper storage for it, it can be obtained; but as it usually has to be brought long distances, it should be ordered well in advance of requirements.

4. *Economic Conditions.*—The climate, if rigorous, is healthy and bracing.

The distance of the mines from a railway is not so serious a drawback, for the Siberian roads are notoriously good, and there is besides a good system of river traffic. The mine which your contributor refers to as 1,200 miles from the railway must be a very special case, but most probably it has river traffic at no great distance. In winter one has the cheapest and finest roads in the world—snow trails and frozen rivers. Roads are *not* impassable for as much as three months—the utmost limit for all ordinary traffic being two months.

Present methods of alluvial work are no criterion; the future lies in quartz mining, which would necessarily be undertaken by modern methods, and there would be no more necessity to stop work here in winter than in British Columbia, Alaska, and other cold countries, where mining operations are successfully carried on all the year round.

There are cheap provisions and labor, often water power, and usually cheap fuel. Transport rates are low.

Your commissioner states that *alluvial* mining must continue for some time to be the backbone of mining in Siberia. Of *Russian* mining, possibly; but I can affirm from my personal knowledge that there are large areas of quartz-bearing country, which offer a splendid prospect to those who will approach the matter with a proper knowledge of the existing conditions. ARTHUR L. PEARSE.

London, Sept. 26, 1904.

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IRON ORE IN SOUTH AFRICA.—For some time past attention has been drawn to certain deposits of iron ore known to exist in the Transvaal and Orange river colonies, and it has been reported that a company was to be formed to work these deposits. Hematite ores, with high content in metallic iron, are known to exist, but it is said that they vary very much within small areas, and also run high in sulphur and phosphorus. However, the ores have not been tested as yet. Another serious difficulty is that Transvaal coal is soft and not adapted for use in the blast furnace, while no coking coals are known to exist in South Africa. The cost of importing coke would be too great to make it possible to smelt the ores profitably. For these reasons they are hardly likely to be worked for some time to come.

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COAL IN CHINA.—A recent British consular report states that the Chinese imports of coal in 1903 were 1,402,701 long tons, and of coke, 8,790 tons, an increase in coal imports of 62,000 tons over 1902. Of the 1903 imports, 804,050 tons came from Japan. The output of native coal, though comparatively small, is growing. If the cost of transport were reduced, Szuchuan coal, an excellent steam fuel, would rival the best grades of imported coal. The mines are near waterways, and special boats could convey the coal to Ichang, whence it could go by steamer to Hankow. A railway line, almost completed, will bring down coal from Ping-hsiang, in Kiaghei, to a point 15 miles above Changsha, whence it will go by tow-boats to iron works at Hangyang that will take 15,000 tons of coke annually. The Peking Syndicate does not expect to furnish Tientsin with anthracite before the end of the present year. In 1903 the Kaiping collieries put out and disposed of 700,000 tons, of which 200,000 tons were shipped from Chingwangtao.

## COPPER MINES OF LAKE SUPERIOR.—III.

By T. A. RICKARD.

The maps showing the holdings of the different companies in the Lake Superior region exhibit none of that confusing interpenetration of claims which characterizes the mining districts of the Rocky Mountains. That iniquitous principle represented by "the law of the apex" is not known; acreage replaces apex rights and simplicity of tenure obviates the interminable litigation which seems to be the necessary baptism of a rich mine in Montana or Colorado.

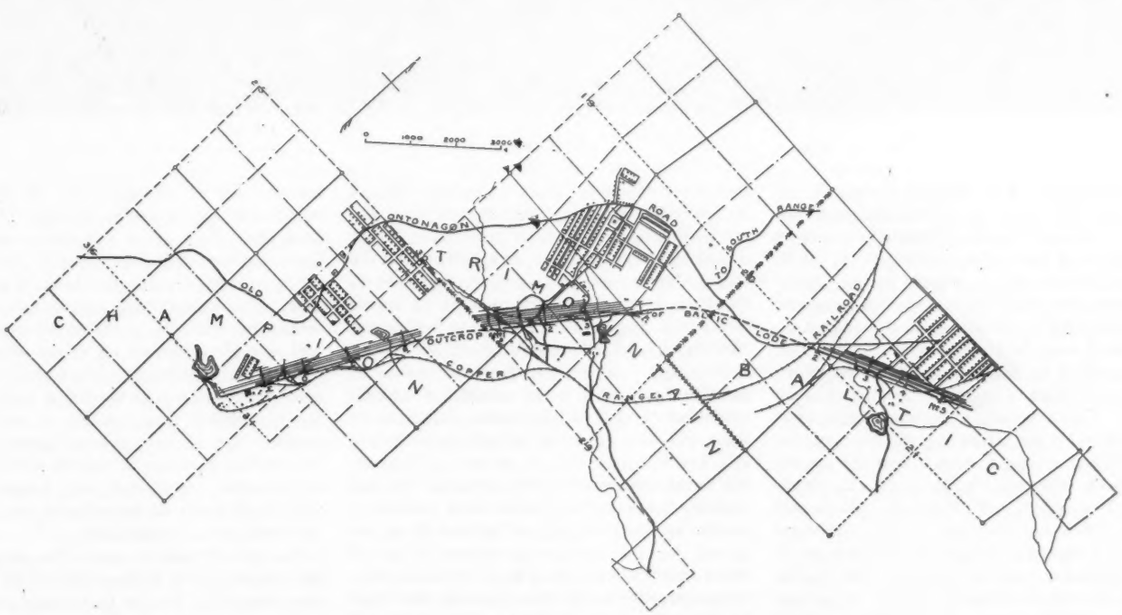
Any map of the region, as, for instance, that of the companies on the South Range, herewith appended, exhibits the checkered squares of the sections into which each township is subdivided. There are 36 sections to a township; the latter is six miles square, so that each section represents 640 acres, further subdivision being made into quarter-sections of 160 acres and these again into 40-acre tracts. The boundary lines carry mineral rights vertically downward, without restriction of any kind. The ownership of the land near the copper mines has passed out of the hands of the original owner, the federal government; it is now held by individuals, where not consolidated into company holdings, there being one exception in the case of the St. Mary's Canal Mineral Land Company, which, by reason of building the great waterway of the Lakes through the Sault Ste. Marie, was given a grant of land, a large portion of which was selected so as to cover that part of the copper belt not already pre-empted. It is on this territory that those discoveries were made which led to the making of the mines on the South Range. Another exceptional landowner is the public school; by State law every Section 16 was set aside as the property of the public schools, and it is a matter of regret that no Section 16 has as yet proved to be the site of a rich mineral development.

The fact that the extension in depth of the lodes was not properly secured by claims in the direction of dip did not enter into the calculations of the early operators, but now that persistence in depth has been established there is more foresight shown. The Calumet & Hecla Company, for example, undoubtedly made a blunder in failing to secure the 'deep level' of their big discovery, an omission which became the basis for the organization of the Tamarack, whose first shaft went down vertically 2,100 ft. before it cut the Calumet conglomerate. At the present time the Allouez is another example of a 'deep level' enterprise, it having been planned on an estimated dip of 38° to cut the Kearsarge-Wolverine amygdaloid at 1,100 feet.

THREE WELL-KNOWN COPPER MEN.
W. A. Paine. John Stanton. F. McM. Stanton.

Bold outcrops of rich ore do not characterize the Lake district, so that the beginnings of a successful mine require more than the ordinary prospector's activity. The Mohawk was found by the uprooting of a tree, caused by the falling of another tree upon it, which had been felled by a wood chopper. Mr. John Stanton had obtained an option on the property with a view to prospecting. The chopper brought him a lump of rock showing copper, which adhered to the roots of the tree, and he then arranged for a systematic exploration. Thirteen pits were put down to a depth of 30 to 40 ft., and for lengths of 25 to 45 ft. across the strike of the lode. All save two of these trenches exposed copper rock of good grade, and the evidence thus obtained was held to warrant the sinking of shafts. In this case the drift overlying the true rock was only 12 to 20 ft. thick, but elsewhere in the district such prospecting is rendered expensive by reason of a heavy overburden of drift. On the Globe ground, just south of the Champion, there is as much as 200 ft. of 'wash,' and in order to determine the position and value of the lode it was necessary to put down two diamond drill holes from a point some distance dipward, so as to strike the lode at right angles, and these holes passed through 225 ft. of drift and 600 ft. of rock before they cut the ore, with results that warranted the expenditure.

A good example of the application of geological knowledge to mining exploration is afforded by the story of the Champion mine. But before this is related, a few introductory remarks are necessary. The trap beds—that is, the layers of diabase forming so large a part of the Keweenaw series—are so nearly alike that identification is ordinarily impracticable, but occasionally some mineralogical characteristic will serve as a guide; thus the footwall of the Kearsarge amygdaloid is a bed marked by large feldspars. Dr. L. L. Hubbard, formerly State Geologist, used this fact to determine the position of the Kearsarge amygdaloid, and he proved that it was a safe indicator. It is also proper to state that the officers of the Michigan Geological Survey recognized the footwall at the Mohawk as being this same bed, before they knew that any openings had disclosed copper, and they made known this identification at once, although it was a long time before the people of the district would admit the correctness of the correlation. Usually the amygdaloid layers are more susceptible to weathering than the compact trap encasing them, consequently they become covered with drift and soil. The con-




THE MINES OF THE COPPER RANGE CONSOLIDATED COMPANY.

glomerate beds, on the other hand, resist erosion and form occasional outcrops. It was through one of these that the Champion mine was discovered. The Champion location covers the southern extension of the Baltic lode; in the Baltic mine there is a conglomerate bed lying 112 ft. to the east—in the footwall—of the Baltic copper-bearing amygdaloid; this conglomerate is supposed to be Marvine's No. 3. In his explorations over what is now the Champion company's ground, and was then a tract of bush land belonging to the Canal company, Dr. Hubbard found one solitary outcrop of what he took to be the No. 3 conglomerate just referred to; this outcrop was 50 ft. long—long enough to give a line of strike; he then stepped off 112 ft. westward and came to a ledge of trap, evidently not what he was seeking; but a few feet beyond there was a depression in the surface marking the course of a stream, in the bed of which he found an amygdaloid. By following the course of this amygdaloid, along another depression between two outcrops of trap, he soon unearthed some copper rock. Then, guided by the strike of the conglomerate, he followed the parallel amygdaloid; he made 13 openings, and found the copper lode in all of them. This was the beginning of the Champion mine, of which the successful geologist just mentioned is now the efficient manager.

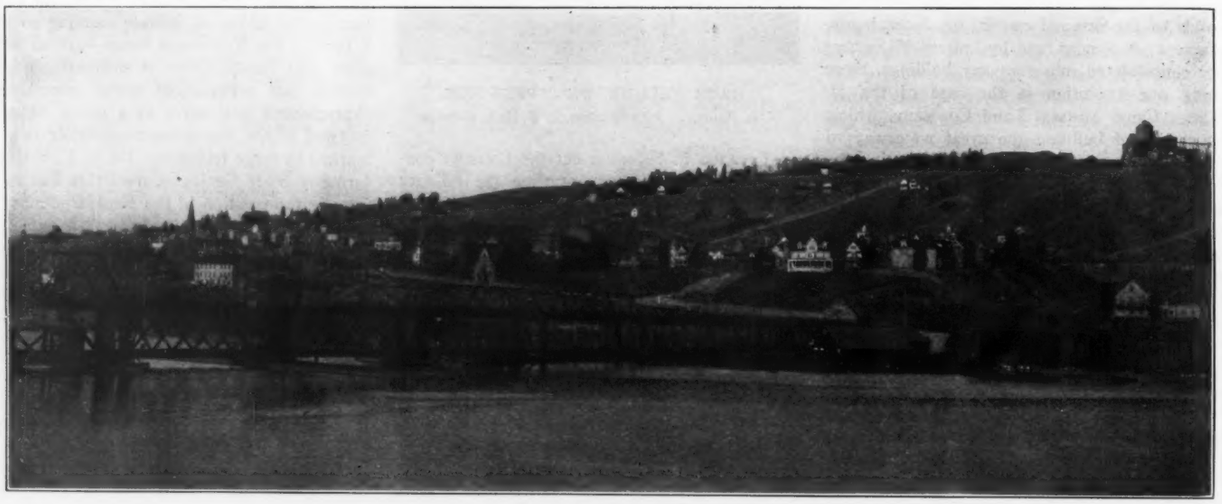
While I was at Houghton there was talk of discoveries on Section 15, a tract on which this same Baltic-Champion lode had been found. As I wanted to see what appearance was made by an infant copper mine of the Lake Superior type, I went to see the discovery, by the courtesy of Messrs. R. E. Pryor, James Blandy and J. P. Edwards. Work was proceeding in an open-cut, recently enlarged from a prospecting trench, at the bottom of which a copper lode was exposed. One foot to 18 in. of soil and gravel formed a surface layer, in which nests of carbonated copper were buried; these were essentially pieces of 'float' copper, so oxidized that the carbonated mass usually contained only a nucleus, as big as a pea, of copper coated with cuprite and buried in malachite and azurite. Under this layer came three or four feet of 'hard pan,' a mass of brecciated rock and gravel well cemented, in which were seen further fragments of copper coated by cuprite and surrounded by the carbonates; below this, within the seams in the amygdaloid rock, there were copper stains for a further depth of 8 or 9 ft., although the country itself exhibited no weathering. The open-cut showed a wide lode carrying metallic copper distributed irregularly and to an extent which the eye could not gauge. A succession of trenches indicated the manner in which the lode had been traced.

Mr. Edwards told me the story of this young enterprise. At the southern end of the ground a solitary outcrop of conglomerate was found by him; as I saw it, it was a rounded hummock amid the bush, rising three or four feet above the general surface and extending for 40 or 50 ft. He sunk pits in this conglomerate, so as to determine the line of the strike and to permit him to infer the relative course of the amygdaloid lode he was seeking. Mr. Edwards had made up his mind that this was the No. 3 conglomerate, which is quite prominent at surface north of the Baltic, and knowing that its normal position was 112 to 115 ft. east of the Baltic amygdaloid, he obtained a line of departure for his prospecting trenches. At 130 ft. he found the lode he was looking for, the greater distance being accountable to the difference in dip, 55° here, as against 73° at the Baltic. Thereupon Messrs. J. P. Edwards, R. C. Pryor and others went to work to secure terms from the owners of the land, which was held in 40, 60 and 95-acre tracts by various individuals. These gave them an option on condition of $10,000 being raised for exploratory work, and, this being done, a local company was then organized to take over the option and distribute the shares pro rata according to the acreage of each participant. Enough treasury stock—50,000 shares—was created to enable working capital to be raised as required for the mining operations; 10,000 of these shares were sold at $1 to meet expenses of prospecting, while the remainder was kept in the treasury for further contingencies. It is intended to proceed with exploration and development. When sufficient work has been done and enough copper rock is accumulated, arrangements will be made to lease a stamp and ship the output over the nearest railroad to the mill.

This story has been related in order to exemplify the manner in which mining enterprises are started in this region. Every district has its own methods, dependent entirely upon the nature of the mineral discovery and the amount of capital required to make it into a profitable mine. Of course, in the case of these low-grade copper mines there is an enormous amount of money required for development, for a mill, usually for a railroad and sometimes for a smelter, before the enterprise is finally placed upon the safe plane of an investment.

In comparing these lodes of native copper to other metalliferous deposits, they are found to present one striking feature—the impossibility of sampling them. To anyone accustomed to precious-metal mining, in which every stage of intelligent enterprise is checked by accurate sampling, the inability to employ this method in the Lake Superior mines, presents a subject of particular interest. It is obvious that the occurrence of the metal in a native condition, and in sizes ranging between the microscopic and masses weighing many tons, offers an insurmountable obstacle to any sampling method which is based essentially on the doctrine of averages. To sample a vein containing free gold in pocketty form has long been given up as a hopeless task, more likely to mislead than to guide; this is practically the problem in the Lake Superior region. No cross-sectional determination of contents by channeling a breast of copper rock will help the appraiser of values, because not only is the distribution of the metal sporadic, but it occurs in a form rendering it impracticable to break a true sample. A moil and a hammer are of no more use than a pocket knife when it comes to cutting across a lump of tenacious metal, and such lumps are the usual ingredients of an ordinary amygdaloidal or conglomerate copper lode.

The sampler and the assay plan are unknown at Houghton or at Calumet; but other methods are employed. In the first place, experience enables a man to judge the percentage of copper in the rock; such judgment is subject to error, as being at best only a guess, but it serves a useful purpose, especially when applied to different faces of the same lode, having its own copper habit, that is, a certain ratio between the lumps and the finer particles. When examining a new discovery or a young mine undergoing early development, an experienced man will separate the 'barrel work' or lumps of



HANCOCK AND QUINCY HILL.

metal coming up in a given number of buckets or cars, and in that way he can determine the number of pounds of copper per ton of rock. Of course, he has no way of getting at the fine copper scattered through the rock, and he must decide from the character of the lode how great a part this plays in the actual percentage of metal present. If it appears from a test such as this that the lode is rich enough to become the basis for a profitable mine, then development is pushed until the enterprise reaches the next stage. This is the accumulation of sufficient copper rock to permit of the leasing of a stamp and the making of a mill run. There is usually some mill in the district which is idle or has a stamp—out of two or three—which can be leased. The work of one stamp means the crushing of from 500 to 600 tons per day, and the trial may cover a shipment of 1,000 tons, or it may mean steady crushing from a continuous output. In either case the quality of the average output of the mine is adequately tested, and this will warrant either the leasing of milling facilities for a term of years or the erection of a mill in connection with the mine. The charge for custom milling ranges from 40 to 45c. per ton.

It was by such methods that most of the mines made their beginning, and it is obvious from this account that the determination of the value of a copper mine requires capital. It takes a gold mine to make a copper mine, but it is fair to add that when the copper mine is once set going in the Lake region it outlasts several gold mines of the average kind.

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SAND-LIME BRICK.—According to a paper prepared by S. V. Peppel for the United States Geological Survey, there are in this country at present about 50 plants, with a total capacity of approximately 1,000,000 bricks a day. The experience of these plants indicates that sand-lime brick can usually be manufactured at a cost below that of common clay brick. Sand-lime bricks have been in use long enough, both in this country and in foreign countries, to prove that when properly made they have sufficient strength and sufficient water and weather resisting qualities to make them a safe building material.

The sand-lime brick is the natural outcome of improvements made in the old mortar brick, which has been known for years. This mortar brick was at first never more than a molded mixture of lime and sand mortar, which was allowed to harden in the air. About twenty-five or thirty years ago, one Dr. Michaelis patented a process for the hardening of mixtures of lime and sand by steam under pressure, which is the fundamental principle on which the manufacture of sand-lime brick is based.

The commercial development of the industry dates back only fifteen years in foreign countries, and not more than four years in the United States. In 1896 Germany had only five factories where sand-lime brick was made, but now it has about 200, with an actual annual output of between 350,000,000 and 400,000,000. Early in 1901 a plant was built in Michigan City, Ind. In 1902 about 20 plants were in existence and 6,000,000 bricks were actually sold. Full data are not obtainable as to the actual output in 1903, but about 20,000,000 bricks have been reported as sold in that year. Many of the factories had just started, and were not manufacturing to their full capacity during the year.

## PREPARATION OF ALABAMA COAL FOR COKE MAKING.*

By L. O. Gabany.

Alabama has 23 veins of coal, of which 14 veins are considered coking coals; out of these only nine furnish coal suitable for making coke, the others being all too high in sulphur. These nine seams are not in such condition that coal from any one could be used by itself, or without preparation. Some of them are very much intermixed with slate partings, and others cannot be mined clean enough, owing to the smallness of the seams and the brittle slate which forms the top or bottom, and in mining will be mixed with the coal. Either some of the seams make a spongy coke low in ash, and unsuitable in structure and texture for blast furnace use; or others are rather high in sulphur, or are dirty, that is, mixed with slate and similar impurities. The best coke is made by mixing coal from different seams. Thus, for instance, a mixture of three parts of coal from the Milldale seam and one part from the Brookwood makes a coke low in sulphur, with moderate ash, dense texture, and in large pieces. It is equal to the standard Connellsville.

In all cases the Alabama coal has to be washed before going to the coke oven. For this purpose four types of machines are used: the Stein washer, the Robinson & Ramsey, the Stewart and the American. The fundamental principle of all these washers is the separation of the light material by a current of water, which is brought in motion either by moving the jigs or by a plunger, or by a strong current of water. The most primitive method of those formerly used is the trough washer, but this has been practically abandoned in recent years.

An important point is the crushing of the coal before washing. It has been shown in practical tests that lump coal mixed with fine coal produces an inferior coke. The process of coking in the oven is uneven. It has also been tried to disintegrate or pulverize the coal. This method for preparing the coal for the ovens I cannot recommend, although it has many advocates. The fine coal checks the fusing process in an oven; and in examining the physical structure of cokes made out of disintegrated coal we will find that the coke has no tendency to split lengthwise, but it stays in short lumps. The coke nearest to the bottom is dense in texture; but after reaching the center it begins to have open pores, and the top of the coke is composed of a spongy mass, which, if not burned up in the oven, is absolutely useless for a furnace, as it has no strength to hold any burden. It pulverizes and often chokes the furnace. The best sizes of coal for coking coal are all sizes under ¾ in. About one-half of the charge should be ¼ in. and under, and one-half of the charge should be over ¼ in., but not above ¾ in. in size.

This prevents much loss of clean coal, since coal will adhere more or less to the slate, and the specific gravity of a large piece may be such that it will be carried out with the refuse. The best results are obtained if the run-of-mine coal is first taken over the shaking screen with ¾-in. perforations, in order to avoid the crushing of small pieces. Everything over ¾-in. size goes to the crusher. This method improves the material to be washed, lessens the work on the crusher, and will effect a substantial saving in cost.

The Stein washer is composed of a series of stationary jigs, in which a plunger has a vertical motion. The motion of the plunger forces the water through the screen, agitating the coal on same, forcing the light material or coal over the top of the jigger, and the heavy material or slate is allowed to escape at the bottom. The coal must be sized before it is distributed into the series of jiggers—namely, fine (under ¼ in.), medium (over ¼ in. and under ½ in.), coarse (over ½ in. and under ¾ in.); the feed must be uniform; and the material to be washed must be thoroughly and uniformly sized, The capacity of one jigger is not over seven tons per hour with satisfactory results, and then it requires very careful watching; one man cannot attend to more than six jiggers. The results of the Stein jigs are very good.

The Robinson & Ramsey washer consists of a cone-shaped receptacle, into which the water is admitted from the bottom under high pressure, and the material to be washed descends from the top, and is agitated with revolving agitators. The light material or coal floats on the top and is discharged at the top, while the heavy rubbish falls to the bottom, whence it is discharged at intervals. This type of washer is very cheap to operate with good results, if the specific gravities of coal and slate are at big variance.

The American coal washer and the Stewart coal washer are practically alike. The American coal washer has simple mechanical movements. It consists of a stationary tank filled with water, in which a receptacle (jigger), with perforated bottom, has a vertical movement. The material to be washed is fed from the top and farthest end of the square jigger. The light material or coal will float toward the front, where it is discharged; while the heavy rubbish will sink and is discharged into the tank, whence it is elevated to a convenient place. The capacity of one jigger is 30 tons per hour. The quantity of water needed for its operation is less than in any other washer. The coal need not be sized, but should not be over ¾ in. in size, and only one operator is required to handle four jigs. The output is equal to 1,200 tons daily.

To sum up, I may say that the three important questions in the preparation of coal are (1) to wash the coal clean; (2) not to allow any coal to be wasted with the impurities, and (3) to wash the coal as cheaply as possible.

Next in importance after the preparation of coal is the construction of coke ovens. The size of the beehive ovens generally used in Alabama ranges from 11 to 13 ft. in diameter. I have found by experience that the best results are obtained from ovens 12 ft. in diameter, with a 7-ft. sweep. It is a mistake to think that the larger the oven the more coal can be put into it, and the more coke made per oven. There is a limit to everything, and so it is in this case. In the first place, large ovens cannot be charged in proportion to their size and cost on account of the labor. The laborers, especially in summer months, will not draw large charges. In the second place, the work connected with the extraction of the coke from a large oven is much greater in proportion than that with the small ovens, and the labor will cost much more per unit of coke.

An important question yet to be considered is the waste of the gases from the coke-ovens.

*Abstract of a paper read before the Engineering Association of the South, July, 1904.

## CHLORINATION IN COLORADO.

By WILLIAM E. GREENAWALT.

Sixty thousand tons of ore per month are mined in the Cripple Creek district; this output yields bullion worth $1,901,800. The distribution is as follows:

| Process of Reduction. | Tons of ore treated. | Total value. |
|---|---|---|
| Chlorination | 40,000 | $1,049,000 |
| Cyanidation | 9,000 | 192,000 |
| Smelting | 11,000 | 660,000 |

All the ore treated by chlorination is roasted. In the cyanide process 2,800 tons, yielding $168,000, is roasted; the remaining 6,000 tons, yielding $24,000, is treated raw. It will be noted from this statement that roasting, except on dump stuff and low-grade oxidized ore, is universal, and that all the higher grade ore, whether treated by chlorine or cyanide, is roasted.

The preponderance in favor of chlorination is evident. Most of the mills using this process were built after both cyanidation and chlorination had been in practical operation and competition for years. One of the largest of these chlorination mills was built by capitalists who had previously employed both processes side by side in an earlier mill. It may be assumed, therefore, that the survival of chlorination is not a matter of sentiment, nor is it likely that cyanide will displace chlorine in the metallurgical treatment. If the ore has to be roasted, chlorination is quite as cheap as cyanidation. With the application of chlorine, as generated by electrolysis, which is now, and has been for several years, an assured success, cyanide will not be able to compete with it even on the basis of economy.

STANDARD AND COLORADO-PHILADELPHIA PLANTS

The chlorination mills are also encroaching upon the smelters. Five years ago the value of the Cripple Creek ore treated by the smelters exceeded that of all other processes combined. At the present time the ore treated by the chlorination process is almost double in value that treated by the other processes, and in tonnage it is four times that treated by the smelters.

The barrel process, to be described, represents the best modern practice. The mills have a daily capacity of 1,500 to 1,800 tons. The assay value of the ore varies from 0.75 oz. to 5 oz. ($15 to $100) in gold per ton. By far the greater portion of the ore assays from 1 oz. to 1.5 oz. ($20 to $30). The usual silver content is from 0.25 oz. to 0.50 oz. per ton, and the sulphur of the mixed ore at the bedding floors from 1.5 to 3 per cent.

The methods employed, the machinery used and the results accomplished are much the same in all the mills. Differences are confined to matters of detail. The total cost of treatment varies from $2.75 to $3.50 per ton, and the extraction, as represented by the bullion output, from 90 to 95 per cent. The variation in the cost of treatment is due, largely, to the character of the ore. Oxidized, or partially oxidized, ore can be treated cheaper and gives a higher extraction than the sulphide ore from the deeper levels of the mines. The capacity of the roasting furnaces is dependent on the sulphur content. Their capacity is greater, and the consumption of fuel is less for the oxidized than for the sulphide ore. The chemical consumption in the barrels is also usually less for the oxidized than for the sulphide ore, even though the sulphide ore is thoroughly roasted.

Physical composition also has an important bearing on the treatment, and on the extraction. Ore from some mines is more susceptible to treatment than that from other mines in the same neighborhood. There is even at times a great difference in the treatment of ore from different parts of the same mine. Ore containing considerable tellurium is more difficult to treat and gives a lower extraction than the sulphides.

The average chemical composition of Cripple Creek ore is about as follows:

| | Per Cent. | | Per Cent. |
|---|---|---|---|
| $SiO_2$ | 60 to 70 | S | 1.5 to 3 |
| $Al_2O_3$ | 18 to 22 | Pb | tr to 0.10 |
| CaO | 1.5 to 2.5 | Zn | tr to 0.10 |
| MgO | 0.10 to 0.25 | Mn | tr to 0.15 |
| BaO | tr to 0.25 | K and Na | .5 to 10 |
| Fe | 3 to 7 | with traces of Te and Cu. | |

The general order of treatment is:

1. Sampling, (1) crushing, (2) rough rolling, (3) rough screening.
2. Bedding the ore.
3. Fine crushing, (1) drying, (2) finishing rolls, (3) finishing screens.
4. Roasting and cooling.
5. Chlorinating in barrels.
6. Concentrating the barrel tailings.

*Sampling.*—The ore as it comes from the mines is passed through large, automatically-fed crushers, which break it to about 2.5 in. It is then passed to the roughing screen, which in the different mills has openings from half-inch to one inch. The oversize goes to the roughing rolls to be re-crushed. A sample is taken after the roughing screen, as the ore goes to the bedding floor; this sample is gradually reduced in quantity and size of particles. Blake crushers, having an opening of 12 in. by 24 in., are in general use. The roughing rolls vary considerably in size; some are geared, while others are belt-driven.

*Bedding.*—The lots of ore vary from 0.25 per cent to 5 per cent in sulphur, and from 1 to 3 per cent in lime; the gold content may also differ quite as much. In order to get a uniform sulphur product for the furnaces, and lime and gold product for the barrels, a mixture is made. This is done by bedding it, so that a cross-section of the bed represents the average composition. If the lots composing the bed were treated separately, and succeeded each other through the mill, it is evident that the temperature of the furnaces, and rate of feeding, for one per cent sulphur ore would be absolutely disastrous to ore containing 5 per cent sulphur. Again, a chemical charge which would give excellent results on ore containing one per cent lime might not even give an excess of chlorine where containing 3 per cent. In order, therefore, to get uniformity in the working of the mill, a uniform product is prepared for it. A bed frequently contains from 3,000 to 4,000 tons.

*Fine Crushing.*—The ore is taken from the bedding floor to the dryers, where the moisture is driven off before fine crushing and screening. These dryers are either revolving cylinders or mechanically-operated reverberatory roasting furnaces. In some of the mills the ore is given a thorough drying, while in others, if not too wet, so that the particles will adhere in rolling or screening, it is not dried at all. Sometimes ore containing even two per cent moisture is crushed without drying. The fine crushing is done entirely with belt-driven rolls, the speed ranging from 54 to 100 rev. per min. There is also great latitude in the size and weight of these; the largest size used has an 18-in. face and a 42-in. diameter, weighing complete 34,000 lb. Revolving screens are employed, also vibrating and shaking screens; the reduction varies from 8 to 16-mesh, occasionally to 20-mesh, 12-mesh being the average.

*Roasting.*—Most of the ore is roasted in chain-driven straight-line Wethey reverberatories, and in circular-hearth Pearce furnaces. The oxidized ore contains as low as 0.25 per cent sulphur; the unoxidized, from the deeper levels, contains as much as 5 per cent; the average is from 1.5 to 2 per cent in the custom mills, and from 2.5 to 3 per cent in those belonging to mining companies. The reason for this difference is that, in the large mines, much of the oxidized ore from upper levels was shipped to custom works before their own mills were built. It is, therefore, no longer possible to secure a mixture as low in sulphur as in custom mills, which receive a great variety of material.

Ore low in sulphur—from one to two per cent—is roasted until it contains between 0.25 and 0.60 per cent; that carrying from 2.25 to 3.5 per cent to between 0.50 and 0.85 per cent. The furnace capacity ranges between 60 and 100 tons per 24 hours. Most of the mills are equipped with furnaces which regularly roast 100 tons of ore containing from 1.5 to 2.5 per cent sulphur. When the sulphur exceeds 2.5 per cent the capacity drops to about

90 tons, while, on the contrary, if the sulphur is less than 1.5 per cent the capacity may even exceed 120 tons. The hearth-area is between 1,100 and 1,500 sq. ft.; the grate-area is about 75 sq. ft. Many of the furnaces are fired with producer gas. The producers are of the Duff and Taylor type. Coolers are placed directly under the roasting hearth, so that the ore on issuing from the roasting hearth drops to the cooling hearth, to be turned and advanced by the rabble.

The consumption of fuel varies from 10 to 15 tons of western bituminous coal per 100 tons of ore roasted. Lignite is used to some extent in connection with oil, but is not as effective as the longer flame bituminous. Oil and residuum are used, but generally in combination with coal. If they are used together it takes about 5 tons of coal and 150 gal. of oil per 100 tons of ore.

The ore, in roasting, is given an initial heat of from 800° F. to 1,000° F. under the first fire-box, and a finishing heat varying from 1,450 to 1,600° F. If 1,600° is exceeded the ore is likely to fuse.

The charge remains in the roasting furnace from 2.5 to 3 hours, and on the cooling hearth from 1.5 to 2.5 hours. The bed is from 2.5 to 3.5 in. deep. The angle of the rabble blades is from 18° to 25°. In some furnaces the ore is rabbled every 17 seconds, in others every 35 seconds. One man attends a furnace; he usually has a helper to wheel the coal and ashes. One such helper attends to three furnaces.

The cost of roasting ranges from 40 to 50 cents per ton, estimated approximately as follows, per 100 tons:

| | |
|---|---|
| Coal, 12 tons at $2 per ton | $24.00 |
| 3 furnacemen at $2.50 | 7.50 |
| Coal and ash trammer | 2.25 |
| General repairs, oil, water, etc. | 5.00 |
| Power | 5.00 |
| Cost per 100 tons | $43.75 |
| Cost per ton | .4375 |

These estimates include cooling, conveying, etc. The furnaces do not give much trouble. It is not unusual to have a 100-ton furnace in continuous operation for several months without a serious shut-down; with occasional changing of the rabbles the roasting proceeds indefinitely.

The accumulation in the dust chambers is usually from 1.5 to 2.5 per cent; it is either shipped direct to the smelters or briquetted before shipment; in some cases the dust is treated at the mills. The average value is higher than that of the ore; this may be due to the fact that, in crushing, the sulphides and tellurides are pulverized more than the quartz. There is no appreciable loss by volatilization in oxidizing roasting.

A shallow bed, in roasting, with less time, gives better results than a deep bed with more time, the capacity of the furnace remaining the same. This is entirely a matter of air supply for oxidation. It is impossible to get the required amount of air for the desired oxidation of the sulphide ore when the bed exceeds two or three inches, unless the time is prolonged beyond the economic limit.

The amount and relative proportions of chemicals to be used depends upon the nature of the ore and the character of the roasting. Excessive pressure, or excessive chemical charges, are no longer employed; nevertheless, sufficient chlorine must always be generated to extract the gold in a reasonable time, irrespective of the quantity actually consumed by the ore. The usual barrel charge is:

| | |
|---|---|
| Ore | 20,000 lb. |
| Water | 10,000 " |
| Sulphuric acid (66° B) | 200 to 400 " |
| Bleaching powder (33½ per cent Cl) | 100 to 200 " |

The acid costs from 1 to 1.25c. per lb. and the bleach from 2.5 to 3c. per lb., delivered.

Most of the mills use barrels treating 10 tons of ore at a charge. The Economic is equipped with barrels of twice that capacity, but this larger size is not in favor. The 10-ton barrel is 66 in. diam. and from 14 to 16 ft. long; it weighs 34,000 lb. In construction it consists of a ⅝-in. steel shell with cast ends; the inside is lined with ⅜-in. sheet-lead weighing 24 lb. per square foot.

All the barrels have a filter inside. There is no uniformity of construction. The filters most used are made of finely perforated sheet-lead weighing 4 or 6 lb. per sq. ft., laid on lead plates ½ to ¾ in. thick, perforated with ⅜-in. holes, ¾ in. between centers. These plates are supported by a wooden frame, which in turn is firmly secured to the barrel. The perforations are about 3-32 in. diam. and about ⅜ in. apart. Their life varies from 20 to 60 charges. The wooden frame lasts about three months. The filter also acts as an agitator to thoroughly mix the ore. One of the fundamental principles of barrel chlorination is agitation, and filters constructed with this in view give the best result.

The ore is chlorinated from 2.5 to 4 hours. During chlorination the barrels revolve from 3.5 to 4.5 rev. per min. The time of filtering varies from 2.5 to 4 hours.

The total amount of solution is from 1 to 1.4 tons per ton of ore treated. In the best work

BARREL ROOM, UNION CHLORINATION PLANT.

one ton of ore makes one ton of solution, so that the assay-value of the solution approximates that of the ore. Much depends upon the filters, and much also on the quality of the roast. Well roasted ore filters better than ore poorly roasted, and there will be fewer re-charges. Every re-charge doubles the original volume of solution.

After chlorination, filtration is effected with a water pressure of from 25 to 50 lb. The water is turned on as soon as the barrel is at rest, without waiting for the charge to settle or the original charge-water to drain. In order to increase the rate of filtration, the barrels are frequently 'back-pressured,' that is, the water is introduced at the bottom and forced up through the filter to clear it. This results in excessive dilution of the solution. With some filters it is necessary to 'back pressure' every time the barrel is charged and stopped to place it on filter; with others it is a matter of convenience and discretion.

The solution, as it first issues from the barrels, flows into boxes where the coarse sand is eliminated. It then runs into the settling vats, where it remains for about 24 hours. After thorough settling it is drawn into the precipitation vats.

*Precipitation.*—Hydrogen sulphide is the precipitant; charcoal was employed for some time and gave satisfactory results. Sulphur dioxide was formerly used in connection with hydrogen sulphide, but this practice has been discontinued.

The precipitation vats usually hold from 75 to 100 tons of solution. The hydrogen sulphide is generated from iron sulphide and sulphuric acid, in the following proportions: Iron sulphide, 1 lb.; sulphuric acid, 2.5 lb.; water, approximately 6 lb. These chemicals will ordinarily precipitate the gold from 1.5 tons of solution or from 1 to 1.5 tons of ore. The quantity of precipitant is independent of the amount of gold in the solution. Most of the precipitant first combines with the free chlorine to form hydrochloric acid; much also is wasted as it bubbles up through the vats unconsumed.

The application of the hydrogen sulphide is simple, and the precipitation is thorough and complete. If the solution is properly precipitated, the filtrate will never assay more than a trace—that is to say, less than 0.0005 oz., or one cent per ton. Copper and lead are the only base metals likely to be precipitated by hydrogen sulphide. In Cripple Creek ore these base metals rarely occur in quantities larger than a trace, so that there is no serious difficulty from that source. Free sulphur is the element most likely to give trouble. Hydrogen sulphide is freely soluble in water, and if an excess is used free sulphur is precipitated, owing to the fact that the hydrogen of the hydrogen sulphide combines with the free oxygen in the solution to form water. Some free sulphur is also precipitated in the reduction of ferric to ferrous chloride. Great care is necessary to stop the flow of the precipitant at the right time, when all the gold is precipitated so that no appreciable excess of precipitant is left. The sulphur in the precipitate varies from 15 to 25 per cent.

The hydrogen sulphide is applied to the solution through perforated lead pipes in the bottom of the precipitation vat. When the pressure in the generator begins to subside, compressed air is forced through it, and this carries the gas into the solution. After the solution is precipitated it is allowed to settle for about 8 hours. The clear supernatant solution is then decanted through a collar about four or six inches above the bottom of the tank, into the decanting filter-presses. Almost all of the gold remains in the bottom of the vat with the four to six inches of solution still remaining. When a sufficient number of vats have been precipitated the accumulated precipitate is swept into the pressure tank and forced, by means of compressed air, into the clean-up filter-press. The resulting cakes are dried by forcing air through them. The presses are then cleaned, the gold sulphides roasted in small muffle furnaces, and then melted into bullion.

The filter-press used has plates 24 in. square. The number of plates is a matter of discretion; ordinarily 40 plates and 40 rings are used, giving a filtering area of 220 sq. ft. and a cake one inch thick.

The cost of chemicals for precipitating is about five cents per ton.

The approximate cost of chemicals per ton for chlorinating is:

| | |
|---|---|
| Bleach, 15 lb. at 2.5c. | $0.375 |
| Acid, 30 lb. at 1.25c. | 0.375 |
| Total | $0.75 |

Including re-charges and extra chemicals for the higher grade ores, the average cost will closely approximate 80 cents.

The cost of treatment may be summarized thus:

| | |
|---|---|
| Sampling (including coarse crushing and bedding). | $0.30 |
| Fine crushing (12 to 16 mesh) | 0.35 |
| Roasting | 0.45 |
| Chlorinating and precipitating | 1.00 |
| Repairs | 0.25 |
| Storehouse supplies | 0.25 |
| Concentrating. | 0.10 |
| Superintendence; mill-office expenses, assaying | 0.15 |
| General labor | 0.05 |
| Total | $2.90 |

Most of the mills are obliged to pump water from adjacent streams; this is not included in the above estimate. There are also repairs on the tailing dams, not included, since these items do not properly belong to the cost of treatment and vary with every mill.

*Concentration.*—The barrel tailing is usually concentrated. There is considerable free gold in the ore, in particles too large for the chlorine to dissolve in the time of treatment. Some of the assay value of the tailing is also in the iron oxide.

The degree of concentration and the value of the concentrate vary with the ore and the extraction made in the barrels. Usually it will be about 100 into one; sometimes it goes as high as 120 into one, and sometimes as low as 75 into one. Only about 20 per cent of the gold in the barrel tailing is recovered by concentration. Much of the intensely fine gold cannot be concentrated at all. It has been tried again and again to amalgamate this fine gold, but without success. The only safety lies in doing good work in the furnaces and barrels, so as to deliver a very low-grade product to the tables. If the barrel tailing is high, the value of the concentrate will be high, and the value of the concentration tailing will also be high. The efficiency of the concentration depends much on the roasting. The concentrate is shipped to the smelters for treatment.

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ALLOYS OF ZINC AND MAGNESIUM.—According to O. Boudouard (*Comptes Rendus*, 1904, CXXXIX, 424-426), the alloys of zinc and magnesium are all more or less brilliantly white in color. That with 10 per cent zinc can be filed or sawn, but as the proportion of zinc increases the alloys become more and more brittle. Their fracture is conchoidal, or in some cases very finely granular.

## THE HAGAN COAL-FIELD.

By Charles R. Keyes.

The newly-opened coal-field at Hagan, in Sandoval county, half way between Santa Fé and Albuquerque, New Mexico, shows some instructive features of the Cretaceous coals of the Southwest. The coal deposits lie near the middle of a broad synclinal valley, about 25 miles wide, between the Sandia and Ortiz mountains. They have been opened chiefly by the New Mexico Fuel & Iron Company, and are tapped by the recently constructed Santa Fé Central railroad, that is to form the connecting link of a new short line between Denver and El Paso. Terminals of the railroad are situated also at Torrance, on the Chicago, Rock Island & Pacific, at Santa Fé, on the Denver & Rio Grande; at Kennedy,

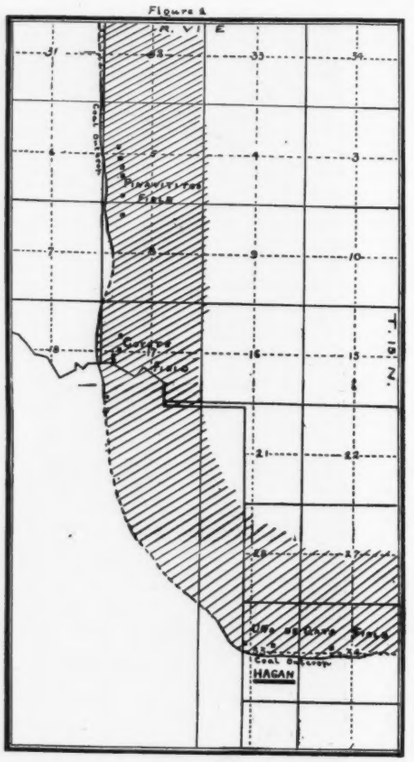


FIG. 2.—THE HAGAN COAL-FIELD.

and soon will be at Albuquerque, on the Atchison Topeka & Santa Fé.

The coal and its associated beds outcrop chiefly along the cañon formed by the San Pedro *arroyo*. The main exposures are practically continuous for eight miles. There are now three principal camps: Uña de Gato, the Coyote and the Pinavititos. The geography of the immediate region is shown in the annexed sketch (Fig. 1). The details of the district are represented in the sketch map (Fig. 2).

The coal measures are chiefly massive yellow sandstones and sandy shales, with some clayey shales, the latter usually inclosing the coals. The coal-bearing sandstone formation rests upon the 'red beds,' and these in turn upon the Carboniferous blue limestones, which attain a great thickness. The coal measures are of Cretaceous age.

The general structure of the coal measures about Hagan is indicated in cross-section (Fig. 3). The vertical sequence of formations, as there shown, is as follows:

| | Feet. |
|---|---|
| Sandstones, massive | 400 |
| Shales, variegated | 1,000 |
| Sandstones, massive | 300 |
| Shales, bituminous | 400 |
| Sandstones, massive | 200 |
| Shales, coal-bearing group | 300 |
| Sandstones, massive | 300 |

From this section and the engraving it will be seen that there are at least four massive sandstone formations alternating with shales. In two at least of the latter there are coal deposits. These formations are quite persistent throughout the entire coal-field.

The coal-beds and associated sandstones and shales are inclined about 15°. At the southern end of the Hagan field, at the Uña de Gato, the dip is nearly north, while eight miles north, in the Pinavititos field, the dip is eastward. At first sight the country appears to be faulted more or less, the similarity of the heavy sandstones crowning the different ridges seeming to substantiate this view. More careful examination, however, clearly demonstrates that the capping of each ridge is a distinct sandstone. Good, continuous rock exposures for over a mile back of the Hagan slope show that there are no faults of any consequence within this distance, and the coals must be very favorably situated for advantageous mining.

The sandstone formations above the 'Red Beds' are in the aggregate probably over 6,000 ft. thick, and there is ground for believing that in this great thickness there is more than one group of coal beds.

At the Hagan slope at the Uña de Gato the coal beds show the following section:

| | | Feet. |
|---|---|---|
| 37—Sandstone, heavily bedded, yellow | | 115 |
| 36—Shale, drab, and shaly sandstone | | 30 |
| 35—Sandstone, soft, massive, light yellow | | 15 |
| 34—Shale, clayey, yellow and drab | | 10 |
| 33—Coal, rather impure on outcrop | No. 1 | 2 |
| 32—Shale, clayey, drab | No. 1 | 1 |
| 31—Coal | No. 1 | 1 |
| 30—Shale, light yellow and drab, sandy | | 12 |
| 29—Sandstone, hard, ferruginous | | 2 |
| 28—Shale, fine and sandy, light yellow | | 11 |
| 27—Coal or bituminous black shale | No. 2 | 1 |
| 26—Shale, clay, light yellow, with thin coal seam | | 15 |
| 25—Shale, drab | | 2 |
| 24—Sandstone, massive, soft, whitish | | 2 |
| 23—Shale, drab | | 0½ |
| 22—Coal, 4 in. clay in middle and thin 1 in. parting | No. 3 | 3 |
| 21—Shale, drab | | 2 |
| 20—Shale, drab, sandy | | 1 |
| 19—Sandstone, massive | | 1 |
| 18—Shale, drab, nodular | | 3 |
| 17—Coal | No. 4, Hopewell vein | 1 |
| 16—Shale, drab, soon disappearing | No. 4, Hopewell vein | 0½ |
| 15—Coal | No. 4, Hopewell vein | 3 |
| 14—Shale, drab, sandy | | 8 |
| 13—Coal | No. 5 | 2 |
| 12—Shale, drab | | 13 |
| 11—Sandstone, hard, shaly, ferruginous | | 1 |
| 10—Shale, light-colored, sandy, massive | | 10 |
| 9—Shale, drab, clayey | | 8 |
| 8—Sandstone, shaly | | 1 |
| 7—Coal, separated by 4 in. drab clay | No. 6 | 1 |
| 6—Shale, drab | | 3 |
| 5—Coal | No. 7 | 2 |
| 4—Clay and sandstone | | 1 |
| 3—Sandstone, soft, massive, straw-colored | | 5 |
| 2—Shale, drab, clayey | | 10 |
| 1—Shales, sandy and clayey, with three thin seams of coal | No. 8 | 20 |

This does not include all of the coal-bearing formation, and there is a space of over 100 ft., to the next heavy sandstone below, where workable coal is likely to exist.

The coals at Hagan may be grouped as follows, with the distances between them indicated:

| | Feet. |
|---|---|
| Sandstone bluff | 170 |
| Coal No. 1 | 3 |
| Interval | 26 |
| Coal No. 2 | 1 |
| Interval | 19 |
| Coal No. 3 | 3 |
| Interval | 9 |
| Coal No. 4 (Hopewell) | 4 |
| Interval | 8 |
| Coal No. 5 | 2 |
| Interval | 33 |
| Coal No. 6 | 1 |
| Interval | 3 |
| Coal No. 7 | 2 |
| Interval | 36 |
| Coal No. 8 | 1 |

The district known as the Coyote coal-field lies about four miles north of the Hagan slope. The main *arroyo* is the one that passes by Hagan and runs northwesterly to the Rio Grande. The coal exposures are in a side *arroyo*. The character and sequence of the rocks are essentially the same as at Hagan, the two fields being continuous.

At the main slope opened in the Coyote field the following section is shown:

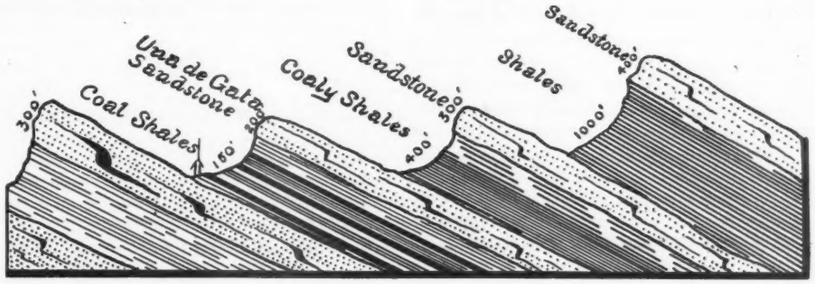


FIG. 3.—GEOLOGICAL CROSS-SECTION OF HAGAN COAL-FIELD.

| | Feet. |
|---|---|
| 10—Sandstone, light-colored, massive | 40 |
| 9—Shale and sandstone, with coal seams | 30 |
| 8—Sandstone, brown, hard | 2 |
| 7—Shale, sandy | 10 |
| 6—Shale, drab | 3 |
| 5—Coal | 2½ |
| 4—Clay, drab | 1 |
| 3—Coal | 0½ |
| 2—Clay, drab | 1 |
| 1—Coal | 2 |

The only important fault observed in the Hagan district is a few feet north of the Coyote slope. It strikes about north 70° east. Owing to this fault the coal mined in the Coyote drift (south mine) and that mined in the middle and north drifts, while in the same narrow gulch, are in horizons several hundred feet apart.

The Pinavititos field lies three miles north and a little west of the Coyote field, and is similar to that field in all essential respects, except that there are no indications of marked faults. There are at least three seams of good coal, each about 4 ft. thick, with a dozen other thinner seams. The exposures are over a mile long, and practically continuous. The coal doubtless extends unbroken north and south of the outcrops. The beds reach the Coyote field, as is shown by drill-holes in the intervening *mesa*.

The coal of the Hagan district is an exceptionally good steam coal, as is shown by the following analyses, made at various laboratories, and by comparisons with coals from other regions.

Analyses of Hagan Coals.

| | I. | II. | III. | IV. |
|---|---|---|---|---|
| Moisture | 5.10 | 2.50 | 7.09 | 0.89 |
| Volatile matter | 39.60 | 39.35 | 41.29 | 32.36 |
| Fixed carbon | 48.92 | 50.60 | 48.17 | 54.88 |
| Ash | 6.18 | 7.18 | 3.45 | 11.87 |
| Sulphur | 0.53 | 0.45 | 0.67 | 1.07 |

Tests by the quartermaster's department of the United States Army shows Hagan coal is superior to every other New Mexican coal, the Los Cerrillos anthracite excepted. The Hagan coal exceeds in fuel equivalents the Colorado coals, with the possible exception of the Coal Basin coals of Fremont county. As determined in the testing laboratories of the New Mexico School of Mines, the fuel equivalent of one cord of average oak wood equals 1,842 lb. of Hagan coal.

On the whole the Hagan district bids fair to be one of the important coal-fields of the Southwest.

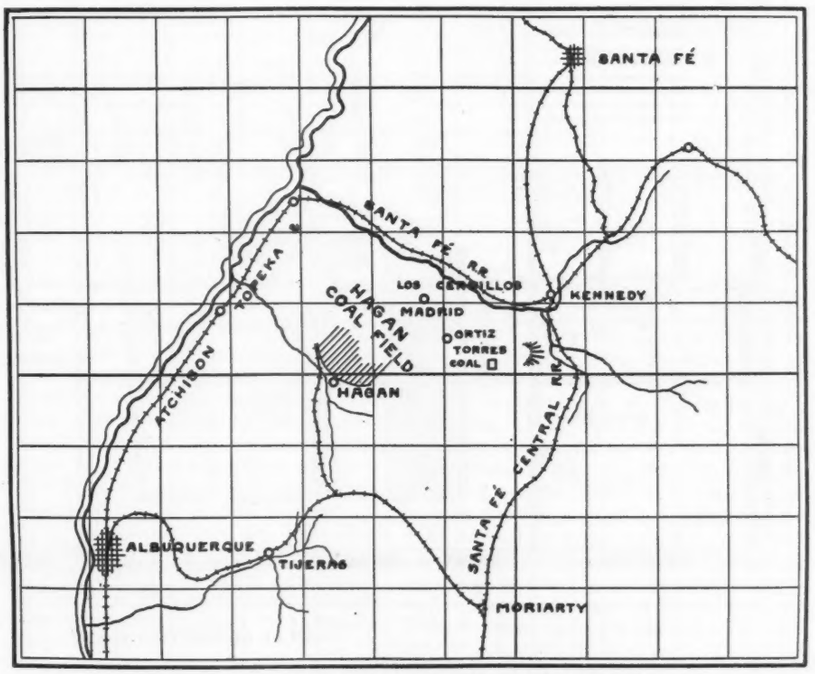


FIG. 1.—MAP SHOWING SITUATION OF HAGAN COAL-FIELD.

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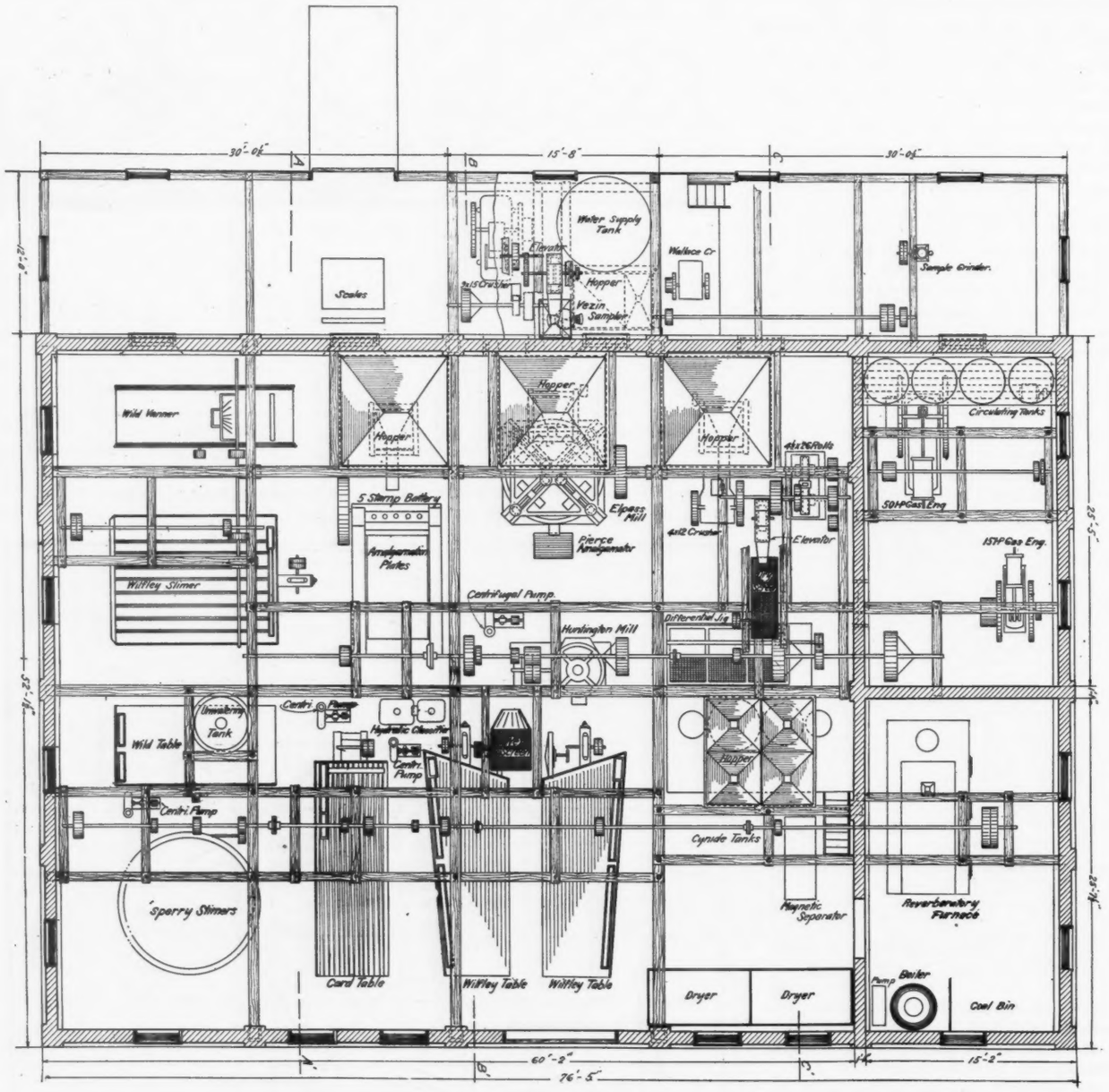
In France serpentine is used for the manufacture of sulphate of magnesia or Epsom salts. Magnesia may be obtained easily from this sulphate.

## A NEW ORE-TESTING PLANT.

This establishment, belonging to the Denver Ore Testing & Sampling Company, is situated at Denver, Colo., and, as its name indicates, is devoted to determining what process best suits different kinds of ore.

The ore to be treated is first crushed through a 9 by 15 in. Blake rock-breaker and elevated to a Vezin automatic sampler, where a fraction of the ore is cut out and delivered by gravity to the sampling room. Here a Wallace crusher reduces the sample to below a quarter-inch size, after which it is quartered down, and the final amount of ore selected for assaying is reduced through a sample grinder to a size suitable for assay. The main body of the ore, in the meantime, proceeds to one of three large steel bins, each feeding a section of the mill. Bin No. 1 supplies the dry-crushing department, consisting of one 4 by 12 in. roll-jaw crusher and 4 by 28 in. high-speed rolls, equipped with an elevator and shaking screen. The fine product from this section is conveyed into another four-compartment steel bin, from which place it can be charged to the reverberatory roaster, a three-compartment jig, the cyanide tanks or concentration tables. This department contains, furthermore, one Knowles magnetic separator, to be used for the separation of the zinc and iron in connection with concentration. Bin No. 2 discharges into the Elspass roller mill. From this machine and from the five-stamp battery, being fed from bin No. 3, the crushed ore is pumped to hydraulic classifiers, of which two kinds are represented—the Isbell and the Denver Engineering Works'—or through a shaking screen of improved pattern, where wet sizing can be accomplished. The coarse ore from either of these machines can be fed direct to concentrating tables of the Wilfley, Card or Wild pattern, while the slime overflows into a cone unwatering-tank, from which the different slime tables of the Sperry, Wilfley and Wild type are fed. The middling from the concentration tables can, furthermore, be re-ground in a 3½-ft. Huntington mill or in a stamp battery. Another combination can be made by using the three-compartment jig, where ore can be crushed either dry or wet, and charged directly to the jig, and the tailing from same can be automatically re-ground in the Huntington mill and can then be delivered to the concentrating tables for final treatment.




PLAN OF ORE-TESTING PLANT.

The cyanide department of the plant is complete and is worked on the gravity system, the standardizing vats being placed high enough to let the solution flow into the leaching vats, and then through zinc-boxes to the sump vats, from which place the solution is returned to the standardizing vats on top by a steam pump.

The plant is, furthermore, equipped with its own independent water-works; power is supplied by two gasoline engines, one of 40 h.p. and the other of 15 h.p., the larger driving the crushing department, while the smaller sup-

plies power to the concentrating department. Electricity is generated by a 5-kw. dynamo, both for lighting purposes and for the Knowles magnetic separator.

Adjoining the testing plant is a separate building containing a perfectly-equipped laboratory and assay office, and both this building and that of the mill itself are substantially constructed, with cement floors, concrete foundations and brick walls.

The managers of the plant, Messrs. Bonnevie & Lee, have for many years been well known as mill designers and mining engineers, and the metallurgist in charge, Mr. C. A. Hoyt, has had long and valuable experience in smelters and mills, having been lately connected with the Metallic Extraction Company, at Florence, Colo., under the management of Mr. Philip Argall.

## IRON AND STEEL IN FRANCE.

Official figures, recently published, give the production of pig iron in France for the first half of the year as follows, in metric tons:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Foundry iron | 270,301 | 287,423 | I. 17,122 |
| Forge and steel pig | 1,095,120 | 1,193,214 | I. 98,094 |
| Total | 1,365,421 | 1,480,637 | I. 115,216 |

The production of wrought, or puddled, iron reported was 318,745 metric tons in 1903, and 279,264 tons in 1904, a decrease of 39,481 tons. The production this year included 17,354 tons of sheets and plates, and 261,910 tons of bars, shapes and miscellaneous products. The production of steel for the half-year was as follows, in metric tons:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Steel ingots | 942,658 | 1,042,673 | I. 100,015 |
| Rails | 118,541 | 137,619 | I. 19,078 |
| Sheets and plates | 153,290 | 149,911 | D. 3,379 |
| Structural and merchant steel | 394,740 | 464,120 | I. 69,380 |
| Total finished steel | 666,571 | 751,650 | I. 85,079 |

The figures for finished steel are not quite complete, some minor products not being reported. The statement includes both bessemer and open-hearth steel, which are not given separately.

RADIUM IN AMERICAN CARNOTITE.—In a recent paper before the American Philosophical Society, Alexander H. Phillips describes experiments made by him with ore from Richardson, Utah, containing about 10 per cent of carnotite. The radio-activity of the product obtained was deemed sufficiently high to indicate that radium could be produced in quantity from carnotite, at least from this locality, as 25 lb. of rather a lean ore had been used. Had a ton been worked over in the same way it would yield a gram of chlorides of 60,000 radio-activity as compared to uranium. This specimen was separated in November, 1902, and is as active now as then.

Carnotite is comparatively a new mineral, having been described by Friedel and Cumenge in July, 1899, and for this reason it is not found in most books on mineralogy, and is therefore but little known to the general prospector. It was first discovered in the western part of Colorado, and occurs in Montrose, San Miguel and Mesa counties of that State and the adjacent counties of Utah. It is a uranyl potassium vanadate with three molecules of water of crystallization. Carnotite occurs as a light canary-colored powder disseminated through a fine-grain sandstone. It is easily soluble in acids, and is treated in this way for the commercial production of uranium salts.

## COPPER DEPOSITS OF MT. SICKER, VANCOUVER.

By Robert Musgrave.

In view of the prominence which the recent operations of the Tyee Copper Company have given to the ore deposits on Mt. Sicker, the following notes may prove of interest. Mt. Sicker owes its present development to the fact that in 1897 a forest fire swept bare the hillside, disclosing a gossan outcrop, which proved to be the capping of large and rich orebodies.

Rising abruptly from the Westholme valley on the west, through which runs the Esquimalt & Nanaimo railway, the mountain reaches a height of nearly 2,000 ft. Conical in shape, rugged in outline, covered from base to summit by large and dense timber, the topography in no way differs from that of the major portion of Vaucouver Island. Soil and an accumulation of forest debris render the prospector's task arduous and the study of geologic conditions difficult. The known orebodies occur near the summit of the mountain, on its eastern slope, in a wide band of crystalline schist which has an east-west trend. The lateral extent of the schist is obscured by a bed of unconformably overlying Cretaceous shale, which originally covered the whole mountain. This shale, where in evidence, conforms to the general structure of the hills, forming anticlinal and synclinal folds, affording undoubted proof that the mountain is an uplift of comparatively recent date.

An intricate igneous complex is formed by numerous dikes, which traverse the schist along the same general strike. These dikes appear to be of considerable extent, but underground development has revealed the fact that they are narrow, having overflowed on reaching the surface. The schist, in general, is light green in color, with alternating bands of gray and black, due to the presence of graphite. It dips steeply north at an angle of 85°, but faulting and later intrusions have produced marked local variations both in dip and strike. The rock has been broken by dislocations, along which the ores have been deposited, forming large lenticular masses, which conform, in the main, to the schistosity both in strike and dip; but cases are not wanting where the ore appears to cross the dip of the country, although with such soft and easily mashed materials it is difficult to measure the unconformity. The orebodies have a well-defined footwall, wonderfully strong and persistent. As found in the lower workings of the Lenora, Tyee and Richard III mines, over a distance of 2,000 ft., this footwall carries an almost unvarying dip and strike; it is separated from the ore-bearing zone by a clay selvage, in places two feet thick. There is no hanging wall to the orebodies as far as present exploitation indicates, although the country has been cross-cut for a distance of nearly 400 feet.

Single specimens of most of the rocks have been examined microscopically. The footwall is a porphyrite, very much sheared and altered, showing the typical porphyritic structure and containing phenocrysts of a lime-soda feldspar and hornblende in a holocrystalline groundmass. Strain phenomena are developed to a marked degree, and much of the feldspar has been altered into epidote and the hornblende into chlorite. The ordinary green schist of the mineralized country represents a very much more sheared and altered condition of the same rock. Whether the metamorphism is of thermal or dynamic origin is a question which can be decided only by an abler and more detailed examination; the probabilities are that each played their part; but that the latter was of pronounced importance, not only in causing changes in the appearance and structure of the rock, but also in preparing the cavities for the later deposition of the ores, is plainly evident. The graphitic schist which, under the microscope, is seen to be composed of quartz and calcite or dolomite very much crushed and broken up into a fine mass, with veinlets of graphite running all through it, evidently differs in origin from the foregoing and presents one of the numerous and interesting problems in connection with these ore deposits which yet remain to be solved. The composition suggests that it is a disguised sedimentary, but present structure affords no clue to past history, unless the schistosity is interpreted as conforming to original bedding planes. A thin slice of the nearest dike, which runs parallel to the footwall, shows the rock to be a diabase, or closely allied rock; but it is so completely altered and the original structure so obscured that its exact determination was not possible. It contains a considerable amount of titaniferous iron, which is shown by the development of leucoxene at the perimeter of the sulphides—a common constituent of these rocks.

The ore is chalcopyrite, associated with pyrite, blende and galena, in a gangue consisting mainly of barite, with some quartz and calcite. The average assay of ore sent from the Tyee mine during the year was:

| | |
|---|---|
| Copper | 4.56 per cent. |
| Silver | 2.87 " |
| Gold | 0.14 " |
| Iron | 11.94 " |
| Zinc | 6.60 " |
| Silica | 13.50 " |
| Alumina | 3.95 " |
| Barium sulphate | 37.30 " |
| Lime | 2.20 " |
| Magnesia | trace. |
| Sulphur (as sulphides) | 16.62 " |

This analysis may be taken as typical of the Mt. Sicker deposits.

The gold values are wonderfully constant; individual assays have seldom failed to give an appreciable amount. As no visible gold has been found, except in one instance, this metal is evidently very finely distributed throughout the ore; these facts indicate its probable deposition contemporaneously with the other metals.

Oxidized minerals are rarely found either in the Lenora or Tyee mines, the main bodies of ore being pure sulphides. The gossan, which led to their discovery, is only exposed for about a hundred feet on either side of the western boundary between the above claims; no evidence whatever exists on the surface of the large bodies which have been developed in an easterly direction in the Tyee. The ore appears to pitch into the mountain; as, in the Richard III mine, which extends from the eastern Tyee boundary, a considerable depth had to be reached before ore was encountered. Here, however, oxidation has played its part, and the ore, while giving evidence of its original similarity to that found in the Tyee, has been subjected to reconcentration, resulting in the formation of the richer sulphides. Pure oxide or carbonate is rare. About a hundred feet to the north of the main line of ore deposition in the Tyee a separate and apparently distinct 'vein' has been found, which has proved more susceptible to the influence of downward-moving surface waters, resulting in secondary minerals down to the depth of 165 ft., which is the greatest that has been reached on it; the same conditions are found, however, at over 500 ft. on this same 'vein' in the Richard III.

The orebodies, as is usual in schistose rocks,

are lenticular and irregular in form, both vertically and horizontally; at the 165-ft. level in the Tyee, where they have received their greatest development, they continue, in a more or less connected line, for the whole 1,500 ft. of the claim, extending westward into the Lenora and eastward into the Richard III, pinching and swelling in a marked manner. In places the bodies are 40 ft. wide, remarkably clean and free from waste.

The change from ore to country is sudden and well defined. The former may be said, in general, to conform to the schistosity of the latter, but locally every conceivable unconformity exists. That a considerable amount of movement and pressure has taken place since the deposition of the ore is apparent from the schistose structure which the latter has developed in places; the lamination planes are parallel to the footwall, and also to those of the country, showing the movement to have been similar to that much greater and older one, which rendered the rock itself schistose. These movements have given rise to post-mineral faulting, which is plainly to be seen in 'slickensided' surfaces; but such faulting is, in general, at a small angle to the wall bounding the deposits, and, while clay-slips and selvages remain as evidence of the latter, it is extremely doubtful whether even the most scientific examination would suffice to reach a satisfactory conclusion as to the amount of throw in the midst of such conditions.

The form of the orebodies follows no rule. The dislocating forces which produced the cavities may have been due to the intrusion of the diabase dikes, forming channels for the passage of mineralized solutions; but it is uncertain whether these dikes came into existence before or after the formation of the orebodies, although the conditions point to the former hypothesis as being the correct one. The fact remains, which is sufficient for the present discussion, that the cavities must have been large and due to profound movement. Metasomatism may have taken place to a small extent, but no evidence of this has been noticed, and the marked and sudden change from ore to rock precludes the holding of this view. Large bodies of so-called "mineralized schists" exist, too low in grade to constitute shipping ore, but, nevertheless, carrying appreciable amounts of copper and gold. Here, no doubt, the solutions were not confined to well-defined passages and perforce spread out along the lamination of the schist.

No marked continuity in the vertical extent of large bodies of ore is to be expected. The schist, where subjected to such violent fracturing and movement, would not break in any definite or continuous cavity, but would rather form series, more or less unconnected, of lenticular chambers, now containing ore, which may be difficult to find and will necessitate a large amount of exploration.

The presence of bands of schist containing carbon in the form of graphite, in close proximity to the orebodies, is significant, affording, as they do, an ample re-agent for precipitating metals contained in solution. The Tyee mine, which has made such an admirable record during the last two years, has now reached the 600-ft. level, but no exploitation has been carried on below the 300-ft. level. It will be interesting to follow developments at the lower levels. As seen in the shaft, the same conditions prevail as were found above—the footwall is as strong and persistent as ever, and the schist is heavily impregnated with copper and iron sulphides.

## A MINING ORGANIZATION IN WESTERN TEXAS.

For some time there has been a movement on foot to secure the attendance of mining men at a meeting to be held in Marfa, in Presidio county, Texas. Invitations have been sent to all persons interested in the development of the mining industry in the western section of Texas; and from replies received by those who have the matter in hand it is thought that a considerable number will be present.

The meeting is for the purpose of discussing matters of importance to the development of the region west of the Pecos river, an area as large as the State of South Carolina. In this area are the silver mines at Shafter, in Presidio county, which have had an uninterrupted and successful life of nearly twenty years; the quicksilver deposits at and near Terlingua, in Brewster county, in which successful operations have been conducted for the last four years; the deposits of white and black marble south of Paisano Pass, in Brewster county, and within 14 miles of the line of the Southern Pacific railway; the variegated and white marble near Eagle Flat, and north of Van Horn in El Paso county and near Valentine in Presidio county; large deposits of a fine gray granite, near Altuda in Brewster county, four miles from the Southern Pacific railway, and a beautiful graphic granite along the proposed line of the Kansas City, Mexico & Orient railway, on Alamito creek in Presidio county; the copper-silver ores of Sierra Diablo, north of Van Horn in El Paso county, and the silver-lead-zinc ores of the Quitman mountains, south of Lasca in the same county; the tin ores of the Franklin mountains in El Paso county, and the oil discoveries in Reeves county, north of Toyah.

Among the subjects proposed for discussion are: (1) Changes in the mining laws by which the work of the prospector and mine owner may be encouraged and facilitated; (2) railroad development; (3) the laying out and building of better roads into the mineral districts.

This is the first attempt that has been made to interest prospectors and miners, operating in west Texas, in the formation of an organization for mutual benefit and for advertising the resources of that region. It holds possibilities of no mean order, and there is no reason why such an organization should not be of great value in attracting the attention of capital to this section of the State. While its mineral resources are to a great extent unknown, yet a good deal of work was done there by the former Geological Survey, and during the last few years the University Mineral Survey, supported by direct appropriation, has still further extended our knowledge of it. Practically all of the mineral districts have been covered by the topographic maps of the United States Geological Survey, and the structural geology is fairly well understood.

It would be well to form a Texas section of the International Miners' Association, which has its headquarters at El Paso, and this will be considered at the meeting.

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INTERNATIONAL STEEL PRICE AGREEMENT.—A conference has just been held in Düsseldorf between delegates of the German Steel Trust and Belgian and French representatives, to consider an international agreement as to prices on joists and semi-finished products.

## MANGANESE ORE IN INDIA.

The official report for 1903 of statistics of production in India says that the most remarkable development has taken place in recent years in the mining of manganese ore in that country. This industry commenced little more than 10 years ago by quarrying in the deposits in the Vizianagram State, and from an output of 3,130 tons in 1893, the production rose rapidly to 87,126 tons in 1899, when the richer deposits in the Central Provinces were also attacked, and are now yielding a larger quantity of ore than the Vizianagram mines. In 1903 the total output reached a record of 171,800 tons, which places India among the first two of the countries producing high-grade manganese ore. The ore raised in the Central Province is of very high grade, ranging from 51 to 54 per cent metal, and in consequence of its high quality is able to pay the heavy tax of freight over 500 miles of railway, besides the shipment charges to Europe and America, for the whole of the ore is exported, to be used principally in steel manufacture in Great Britain, Germany and the United States.

By far the largest proportion of ore is raised in the Nagpur district, though work has been begun in the districts of Bhandara and Balaghat, while prospecting operations are in progress in the Chhatisgarh district, in the Jhabua State in Central India, and a few other places, besides Vizianagram, where mining still continues. The work hitherto has been little more than quarrying, and no approach to exhaustion can be said to have occurred in the chief deposits, which, however, are being worked for the highest grade of ore only. In the Nagpur area and in Vizianagram the ore occurs as lenses in the gneisses and schists, attaining a length in one case of six miles, and thickness, in the case of pure orebodies, of over 100 ft. Layers of nodules also occur as the result of the removal of crystalline limestone, through which the nodules were originally disseminated. In the Jubbulpur district the ore is of a lower grade, and is generally a manganiferous limonite, formed by the alteration and concentration of the manganese in the hematites which occur as constituents of the Dharwar (Archean) schists. The most prominent, and soemtimes the only mineral in the purest orebodies is braunite, which is often accompanied by psilomelane. In parts of the Deccan plateau, manganese ore occurs as nodules formed by concentration of the oxide in the decomposition products of the great basaltic lava-flows.

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STATE COAL MINES IN NEW ZEALAND.—The colonial government of New Zealand, which has been working a coal mine at Seddonville for some time, is opening up a second mine at Port Elizabeth. The coal there is of better quality than at Seddonville, and it is intended to work up to an output of 2,000 tons weekly, as soon as the necessary machinery is received. A branch railroad has already been built to the new mine.

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MINING IN BRAZIL.—The British consul at Rio de Janeiro reports the following shipments of minerals and metals from Brazil in 1903: Manganese ore, 161,926 metric tons; gold bullion, 138,305 troy oz.; precious stones (mostly diamonds), value, £113,582; monazite, 3,299 metric tons. During the year a concession was granted to a New Zealand syndicate for dredging on the Piracicaba river, and many other streams have been prospected.

## BOOKS REVIEWED.

*Album of Drawings Relating to the Manufacture of Open-hearth Steel.* By M. A. Pavloff. Ekaterinoslav, Russia; published for the author. With 51 plates and 4 pages reference.

Professor Pavloff has prepared this collection of drawings for the use of the High School of Mines at Ekaterinoslav, in which he is instructor in metallurgy. They constitute a full collection, illustrating the construction of open-hearth steel furnaces in different countries, with brief references, showing the sources from which the illustrations were drawn.

*British Guiana. The Mining Ordinance and Mining Regulations.* 1903. Georgetown, Demerara; Government Printer. Pages, 100.

This little volume contains the mining law and regulations governing prospecting and mining in British Guiana. The law is given in full, and a complete index is added, giving references which enable the reader to look up quickly any desired point. Some pages are appended, giving directions as to the care of health and the treatment of the malarial fever and intestinal diseases, which commonly attack newcomers in many parts of the colony.

*The Thomas Iron Company. Proceedings of the Special Meeting to Celebrate the Fiftieth Anniversary of the Formation of the Company.* Hokendauqua, Pa.; published by the Company. Pages, 64; illustrated.

This is an interesting report of the meeting held to commemorate the fiftieth anniversary of this well-known iron company. The meeting was held June 1 last, and was briefly reported in the JOURNAL at that time. The present pamphlet contains the speeches made at the meeting, with extracts from letters and other notes. It is handsomely illustrated and printed. In connection with the fine history of the company, which was distributed at the time of the celebration, it constitutes a valuable record of the life of a company which was in many ways a pioneer in the iron manufacture in this country, and which has preserved its identity and independence through all the period of combination and consolidation. As to the management, it is enough to say that Thomas iron has always been the standard for a high quality of pig iron. Both the volumes referred to do great credit to President B. F. Fackenthal, Jr., who was, it is understood, mainly their author and entirely their editor.

*Les Pompes.* By R. Masse. Paris, France, 1903; Vve. Ch. Dunod. Pages, 528; illustrated.

This elaborate treatise has some decided merits. Like most French books on technical subjects, its style is simple and direct, in addition the typography is good and the many cuts which are of varying excellence are placed where they belong in the text. The broad scope of the work is due to its being a compilation of a series of articles published in the *Revue de Mécanique*, describing the types of pumps shown at the Paris Exposition of 1900, including a study of the theory of each type and a detailed description of its construction and operation. The author groups pumps into four classes, reciprocating pumps, whether direct or indirect acting; continuous action pumps, including rams, ejectors, pulsometers, etc.; and, lastly, pumps having special features, such as fire-engine pumps. The general principles of hydraulics, the work of pumps, etc., are discussed in the first chapter of the book.

To discuss in detail a work of such scope would be unprofitable. It is enough to say that the book contains a great mass of well-arranged information, and the chapter on centrifugal pumps is of especial value.

*Black Hills Mining Men's Association. Papers on the Mining and Metallurgy of Black Hills ores.* William Letson, Secretary. Deadwood, South Dakota; published by the Association. Pages, 136; illustrated. Price, 25 cents.

This volume contains some statistics of the output of gold in the Black Hills, and a number of interesting papers of the ores of that district, the mining practice and the metallurgical treatment. The papers have been written by men who are actively engaged at various mines and mills in the district, and give records of actual practice in the treatment of ore, its results, and, in several cases, its cost. The authors include a number of well-known mining men and metallurgists, who have been willing to give the results of their work for the benefit of their colleagues. The papers are presented in good, clear type, with many illustrations. The information given is of the practical kind, which is welcomed by mining men everywhere, and the book ought to be interesting to mining engineers, as showing how the men of one district have worked out the problems presented to them—problems which are likely to be encountered in many other regions.

*The Study of the Atom.* By F. P. Venable. Easton, Pa., 1904; the Chemical Publishing Company. Pages, 290.

Whether or not men can to-day see farther into the infinite than in the time of the Pythagoreans is one of those propositions that can be discussed again and again without reaching a definite conclusion. The accumulation of knowledge during 2,500 years has formed a great area of firm ground in the foggy ocean of the unknown. Because man's field of vision is so much greater, it does not follow that his vision is keener. Professor Venable, in the book noticed here, does not attempt to pass judgment on the question. Instead, he tries to give, in simple and lucid style, a summary of the views of many students and philosophers who have offered theories of the constitution of the universe, and, in particular, the rise and development of one of the theories which springs from the early cosmogonies, and has been known for 2,400 years as the atomic theory. The field thus includes man's study of the atoms, speculative and experimental, from the dawn of science to the present day.

The author summarizes in order: the views of the ancients on the nature of matter and the developments of experimental science from the Greek philosophers to Dalton, and then takes up the atomic theory in detail, discussing the relative weights of the atoms, the periodic system, valence, affinity and the constitution of matter. As noted before, the author offers a summary rather than an argument. His views may be inferred from a statement in the introduction: 'This theory has held a longer life than any other philosophic or scientific conception; and has to-day more nearly its ancient form.' This book is a good short history of the theory, and will interest all who care to read of the development of man's conceptions of the universe.

*Manual of the Chemical Analysis of Rocks.* By Henry S. Washington. New York, 1904; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 183. Price $2.

The subject of rock analysis is an important one in geological science, not only in its relation to the descriptive and purely theoretical branch of knowledge known as petrology, but also in its bearing upon economical questions concerned with the source and genesis of ore deposits and the formation of soils. The increased interest that has been shown of late years in these departments of knowledge has naturally given a stimulus to the study of the chemical constitution of rocks. This has been manifested in the numerous analyses of rocks gathered from all parts of the world, and in the great refinement with which the work is now done. Indeed, rock analysis has developed into a comprehensive study, with its own methods and problems. The present work has been undertaken for the purpose of instructing those who have had little or no experience in the subject, except that gained in the ordinary course of quantitative analysis. It is not an attempt to make a complete treatise, but to describe selected methods of rock analysis which have been approved by competent chemists. At the same time, the plan of treatment is wisely limited to silicate rocks, as coal and other organic matter and salines more properly come in the province of the textbook on assaying.

There is no doubt that there is a need for just such a book as Mr. Washington has supplied. With the exception of Hillebrand's treatise, which was published as a special bulletin of the United States Geological Survey, no work has been issued covering the ground from a modern standpoint. The general textbooks on quantitative analysis are wholly inadequate. Moreover, the treatise by Hillebrand was written rather as a guide to the practiced analyst than for the instruction of the student. Mr. Washington has earned well-deserved distinction among the workers in the special field of petrology, and we have no hesitation in commending the present volume.

## BOOKS RECEIVED.

In sending books for notices will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

*Untechnical Addresses on Technical Subjects.* By James Douglas. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 84. Price $1.

*Censo y Division Territorial. Estado de Chihuahua.* Pages, 296. *Estado de Coahuila.* Pages, 208. Mexico; published by the Secretarie de Fomento.

*The Precious Metals in the West of England.* By J. H. Collins. Reprinted from the *Journal* of the Royal Institution of Cornwall. Pamphlet, 18 pages.

*Elements of Mechanical Drawing.* By A. P. Jamison. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 240; illustrated. Price, $2.50.

*Manual of the Chemical Analysis of Rocks.* By Henry S. Washington. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 184. Price, $2.

*Annual Report of the Register of the United States Treasury. Year Ending June 30, 1904.* Judson W. Lyons, Register. Washington; Government Printing Office. Pages, 24.

*Bulletin of the United States Fish Commission. Volume XXII, for 1902.* George M. Bowers, Commissioner. Washington, 1904; Government Printing Office. Pages, 640; illustrated.

*Geological Survey of Tasmania. Report on the Zeehan Silver-Lead Mining Field.* By George Waller. Hobart, Tasmania; Government Printer. Pages, 104; with map and two plates.

*Missouri Bureau of Geology and Mines. The Quarrying Industry of Missouri.* By E. R. Buckley and H. A. Buehler. Jefferson City, Mo.; State Printers. Pages, 372; with maps and illustrations.

*Report of the Director of the Imperial Mint, Osaka. For the 37th Year of Meiji. (Year ending March 31, 1904).* T. Hasegawa, Director. Tokyo, Japan; printed by the Insetsu Kyoku. Pages, 40.

*Statistics of Mineral Production in India for the Ten Years, 1894-1903.* Prepared under the supervision of the Director-General of Statistics. Calcutta, India; Government Printing Office. Pages, 8.

*Second Report of the Geological Survey of Natal and Zululand.* William Anderson, Government Geologist. London, England; West, Newman & Company. Pages, 180; with maps and illustrations.

*New South Wales Statistical Register. 1903. Part III. Land Settlement. Part IX. Agriculture.* Compiled by T. A. Coghlan, Government Statistician. Sydney, N. S. W.; Government Printer. Pages, 32 and 124.

*California State Mining Bureau. Bulletin No. 35. California Mines and Minerals.* Prepared under direction of Lewis E. Aubury, State Mineralogist. Sacramento, Cal.; State Printing Bureau. Pages, 60; with maps and illustrations.

*Iowa Geological Survey. Volume XIV. Annual Report, 1903, with Accompanying Papers.* Samuel Calvin, State Geologist; T. E. Savage, Assistant State Geologist. Des Moines, Iowa; published for the Survey. Pages, 664; illustrated.

*Statistical Compilations on Lead, Copper, Zinc, Tin, Silver, Nickel, Aluminum and Quicksilver, 1894-1903. Eleventh Year.* Compiled by the Metallgesellschaft and the Metallurgische Gesellschaft, A. G. Frankfort-on-Maine, Germany; the Metallgesellschaft, Pages, 68.

## CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

### *Spelter and Zinc Ore Prices.*

*The Editor:*

Sir—I have been much interested in the remarks of your correspondent "Spelter" on this subject, in the Journal for October 13. With the more technical part of his remarks, on the use of western ores, I am not prepared to deal, and accept the facts as he gives them. I can only say, in passing, that it seems to me that every rise in Joplin ore prices brings nearer the time when the smelters will take hold seriously. Hitherto they have postponed the alterations in their work, which will enable them to use the Colorado ores, preferring to go on with their present furnaces, using the better Missouri ores, and taking their chances on getting a supply. To most of the works these changes will be rather a serious matter of expense, probably. Outside of that, however, there is no reason why they should not take the western ores, as the Belgian smelters do now. The point may be reached where they will have to do it, if they are going to live at all. That is, the Joplin people may hold their ores up to such a point that no profit can be made by smelting it—and the smelters must be allowed a little profit, the same as the rest of us.

This brings me to another point in your correspondent's letter, in which I am more particularly interested. He says that flour follows wheat, cotton-goods, cotton, and the like. Now the cases may be similar, but they are not the same. Spelter is not a necessary of life. On the contrary, it is about the least necessary of the important metals. Its price is not regulated by the cost of producing it in a certain district, nor by the cost of ores in one or more districts. It is regulated by the demand, and that is of such a nature that any attempt to advance prices above a normal level immediately checks consumption. The railroad and the builder must have iron and steel; the electrician must have copper; lead is indispensable for a hundred every-day uses; but if it comes to a pinch we can get along for a while without galvanized sheets and sheet zinc. And people will do so if the price goes too high. The fact is, that in this case it is the price of the finished product, determined by demand for it, which should regulate the price of the raw material, or ore.

I do not mean to say that I grudge the Joplin mines their profits, or want to see them working for nothing. I am not only willing that they should make money, but am pleased to know that they are doing so. But there is reason in all things, and it is always good policy "to let the other fellow have a chance."

With regard to the recent exports of spelter, it ought to be understood that they relieved us of a surplus stock, which was rather a weight upon the market. If the smelters who supplied the metal made some concessions, as they probably did, they found their interest and profit in getting rid of the surplus, and down to a safe basis. This is rather a side-issue, however, and does not affect the main question of ore-prices. In the last analysis these must depend upon the price fixed by the demand for the metal.

What zinc miners and smelters ought to do is to cultivate and extend the uses of the metal as much as possible. There are many ways to do this, but it is not possible to go into them now; it would take too much space.

Metal Dealer.

New York, Oct. 21, 1904.

A 5,000-bbl. cement plant will produce daily approximately 427 tons of carbon dioxide from the raw material used, and 657 tons from the coal consumed, making a total of 1,084 tons of a by-product that is wasted, although it is useful industrially. Equally important are the sulphuric acid, potash and soda contained in the kiln gases, which are discharged into the atmosphere. The subject is worthy of careful consideration.

## ABSTRACTS OF OFFICIAL REPORTS.

### *Quicksilver Mining Company.*

The mine and reduction works of this company, capitalized at $10,000,000, are situated at New Almaden, in Santa Clara county, California. In the year ending April 30, 1904, the earnings and expenses were:

| | |
|---|---|
| From quicksilver sales | $184,803 |
| Rents | 10,789 |
| Interest | 515 |
| Total earnings | $196,107 |
| Cash on hand, April 30, 1903 | 31,549 |
| Total | $227,656 |
| For materials and supplies | $33,055 |
| Pay-rolls | 146,455 |
| Taxes | 2,512 |
| Miscellaneous | 1,641 |
| Total payments | $183,663 |

The difference of $43,993 was distributed as follows: Remitted to New York office, $5,005; held as cash, April 30, 1904, $38,988.

The credit balances of property accounts on April 30, 1904, were: Quicksilver on hand, $28,741; supplies, $16,967; ore at hacienda, $32,892; cash on hand, $38,988; remitted to New York office, $5,005; total, $122,593.

The earnings in excess of expenditures for the year were $1,763, to which should be added ore value increase of $8,385, showing a net profit of $10,148.

There were 4,340 flasks (of 76.5 lb. each) of quicksilver produced, having an average value of $40.495 or $175,747 in all. Sales were 4,518 flasks, at an average price of $41.075 per flask, or $184,803 in all. Deducting from this quantity 879 flasks unsold on April 30, 1903, then valued at $43, or $37,797, leaves 3,639 flasks as the product for the 12 months ending April 30, 1904, which sold at an average of $40.397, or $147,006. There has been consigned to the Eureka Company a total of 701 flasks, valued at $41 per flask, or $28,741.

The average cost per flask of the 4,340 flasks produced in the year under review was as follows: Payroll, $33.745 per flask; supplies, $7.99; miscellaneous and taxes, $0.957; total, $42.692. Less rents and miscellaneous, $2.605; increase ore account at hacienda, $1.930; showing a net average cost of $38.157 per flask. Deducting from this the average value of $40.495, leaves a net profit of $2.338 per flask.

Comparing the fiscal year just ended with the previous 12 months, there is shown a decrease of $27,032 in total earnings; a decrease of $4,664 in expenses, and an increase in net profits of $4,366. The decrease in earnings is explained by the reduction in output of 405 flasks, and a depreciation of $2.312 per flask in price. The earnings from quicksilver would be still less were it not for the fact that the cost of production per flask was $38.157, as against $41.59 last year. This reduction of $3.433 in expenses is owing to the smaller wages paid and less cost for supplies consumed; also to the increase of ore account at the hacienda, rentals, and interest on deposits in bank; these items are somewhat offset by increases in taxes and miscellaneous expenditures. The taxes were higher than the preceding year by reason of the State Board of Equalization having raised the assessed value of all property in Santa Clara county 15 per cent for 1903-4.

The smaller production of quicksilver this year is due to 6,131 tons less of ore having been hoisted than in 1902-3. This decrease is attributed principally to furnace No. 2 being out of commission the entire year, and furnace No. 9 being closed down some time for re-

pairs. The furnaces were 353 days less in operation than for the previous year, which also accounts for the decrease in the hacienda payrolls of $2,726 for furnace and soot labor, and supplies consumed, principally in the item of wood, $1,606.

The average yield of all the ore reduced during the year shows a slight improvement, owing to a better grade of ore having been obtained the first half of this fiscal year, 0.448 per cent, against 0.418 per cent. for 1902-3. The cost of obtaining ore from the old dumps has fallen off $4,615, but the cost of daily labor, transportation and some other items have increased. The expenditure for prospecting and deadwork amounted to $22,144, which is somewhat less than the previous year.

There were mined 40,398 tons of rock, of which 11,051 tons were from prospecting and dead-work, and 22,347 tons from vein and stopes, yielding together 5,082 tons 'granza,' and 33,980 tons 'tierras,' or a total of 39,062 tons ore.

The mine payrolls show that an average of 151,636 men were employed for a total of 47,390.25 days, at an average daily wage of $2.199, which makes the total expenditure for labor $104,240.

The various Victoria workings, together with El Colegio and Santa Rita West, have yielded the greater part of the ore supply derived from the mine during the year. Small ore shipments have been made from the Little Grover, San Francisco and Main Tunnel workings, in addition to the few tons obtained from the Clements and Los Angeles tunnels. A considerable quantity of 'tierras' was recovered from the old workings encountered in El Colegio, and development has been active in the old ground situated between the 900 and 1,000 levels in Victoria. The San Francisco and Little Grover, which contributed several thousand tons of metal and 'tierras' last year, become exhausted, and were closed down in July, 1903, so that the total production of the mine shows a slight decrease. The Santa Rita West workings deteriorated considerably during the year. In preceding years this portion of the mine furnished a large part of the total output; but the main pillars lying in the general run of the ore have finally become exhausted, and the work done for the present consists in blasting out the low-grade mineral still showing. The proximity of the old workings makes the prospect of a permanent improvement uncertain.

The work in El Colegio has been extended to within 40 ft. of the 300 level, in direct line with the main tunnel. This tunnel has been re-timbered and opened up to a point where communication with the working has been made by a winze, which serves as a gangway for men and timber, and greatly facilitates the work. During the early part of the year the working yielded some good ore, but the nearer approach to the 300 level shows a decrease in the quality. Nearly the entire output is derived from old workings, and some good break rock and 'tierras' have been obtained from this source. The method of square-setting has been used throughout, which necessitates the use of a considerable amount of timber and labor in filling in the worked-out squares with waste, in order to properly support the loose ground. It is probable that this working will continue to yield low-grade ore throughout the coming year, although an improvement in the quality of the output can not be looked for.

The metal coming from the Victoria during the last six months has been of a lower grade than usual. This fact is due chiefly to the deterioration in the workings above the 800 level. The ore obtained from these ('vug' and 'intermediate') has heretofore been of fair quality, the metal usually making along the hanging in seams several inches wide. The greater portion of this territory is nearly worked through to the Santa Rita West ground, where no ore of importance is showing. The 950 and 1,000 levels, opened up this year, furnished a considerable quantity of low-grade ore and 'tierras' to the total output.

The total number of feet drifted, cross-cut, sunk and upraised in the mine during the year was 4,159, at an average cost of $3.637 per foot for labor and $0.296 for supplies (timber, lagging and fuel not included), making $3.934 per ft., as against $3.071 for the previous year, when 5,568 ft. work was done.

An improvement has been the removal of a 16,000-gal. tank from the Hill to the hacienda, where it is being used for the storage of fuel oil.

At the hacienda, furnace No. 9 has been thoroughly overhauled, and the condensers completely relined and faced with cement, while the partition walls have been rebuilt. The old condenser tank, which has been out of commission for some time, has been repaired, and the system of cast iron pipes, rendered useless by the action of acid, replaced by a set of earthenware pipes. These, being immersed in cool water, form an effective addition to the condensing system. A new water-back, consisting of 11 lengths of 4-in. pipe, has been put in the first condenser, and a marked improvement is shown by the increased quantity of quicksilver now being obtained. Furnace No. 8 has been supplied with a complete set of new water-backs, and the tank condenser system renewed with six new flues.

A new cement floor has been built in close proximity to No. 7 and No. 9 furnaces, forming a convenient place for drying and working the soot.

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UTILIZING COKE-OVEN GAS.—The Yorkshire Coal & Iron Company has recently installed at its Tingley collieries, near Leeds, England, a large electrical plant, the power for which is obtained from gas-engines using surplus gas from a battery of 40 by-product ovens. These engines drive dynamos, the power from which is used for underground haulage, for lighting the colliery, and for other purposes in surface work. The engines are of the Cockerill type, and each is rated at 250 h.p., when running at the normal working speed of 120 revolutions per minute. This plant has been at work for some months with very satisfactory results.

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MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain for the eight months ending August 31 were 1,447,349 tons of coal and 128,709 tons of coke. Exports of minerals for the eight months are reported by the *Revista Minera* as below, in metric tons:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Iron ore | 5,318,908 | 4,899,041 D. | 419,957 |
| Copper ore | 755,218 | 734,380 D. | 20,838 |
| Zinc ore | 84,589 | 86,152 I. | 1,563 |
| Lead ore | 1,822 | 3,610 I. | 1,788 |
| Pyrites | 380,380 | 358,717 D. | 21,663 |
| Salt | 227,806 | 259,205 I. | 31,399 |

Exports of metals were 28,250 tons pig iron, against 28,049 tons in 1903; 20,909 tons copper, against 20,058 tons; 1,551 tons zinc, against 1,380 tons; 119,861 tons lead, against 107,863 tons last year.

## QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

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*Hydro-Metallurgy.*—A discussion has arisen as to the true meaning and scope of the term hydro-metallurgy, and the writer would like to have your opinion on the subject. Would you understand the phrase, hydro-metallurgical plants to include stamp, concentrating, cyaniding and lixiviation work, or would it apply only to plants where chemical processes were employed, and not to mills for concentration by mechanical means? I remember seeing a discussion on this subject in your columns some time ago, but am unable to find the same now, and a reply giving the information desired would be much appreciated.—H. N. C.

*Answer.*—The term hydro-metallurgical treatment, or hydro-metallurgical plants or processes, is properly applied only when water is the direct vehicle of the metallurgical treatment, and not where it is merely a mechanical aid. Of course, water is used in nearly all processes of treating ores, the only exception being a very few employed where water is scarce and difficult to get. In the stamp mill, however, in concentrating plants and in similar processes, the water is simply a mechanical agent used in assisting the process; just as it is in washing iron ore or coal. In leaching ores in lixiviating plants, such as cyanide plants for the treatment of gold ores, or the leaching of low-grade copper ores by acid solutions, water is the direct vehicle of the treatment, and these are properly called hydro-metallurgical processes and plants.

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## RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

LAW IMPLIES AND INFERS NOTICE OF DEFECTS THAT MIGHT HAVE BEEN KNOWN.—A mine-owner, after he has or should have notice of a defect, and the consequent prospective danger to any of his employees who might then or thereafter be employed in the vicinity of such defect, must repair it and make the surroundings safe, and the law will imply and infer notice on the part of such employer of any defects which by the exercise of ordinary care might have been known to him.—Montgomery Coal Company v. Barringer (109 *Appellate Court Reports,* 185); Appellate Court of Illinois.

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MINE-OWNER LIABLE FOR NOT SUFFICIENTLY LIGHTING TRACK.—Where a motorman in charge of a train of cars on an electric railroad in a mine was injured in a collision with a car negligently left on the track by the preceding train, and the track was not sufficiently lighted to enable the motorman to see plainly obstructions so left, the proximate cause of the injury was the negligence of the mine-owner in failing to provide proper lights, and not the negligence of the motorman's fellow servant in charge of the first train.—Central Coal & Iron Company v. Pearce (80 *Southwestern Reporter,* 449); Supreme Court of Kentucky.

When Junior Locator Cannot Claim Rights in Lap as Extralateral.—Where there are two conflicting lode locations, each having a portion of the apex of the same vein, and there is a conflict with reference to the dip rights within the surface rights of the two locations, the senior location must prevail, and the junior locator cannot claim rights in the lap under the doctrine of extralateral rights. The legal end-lines of an original discovery vein are the end-lines of veins within the surface boundaries with respect to extralateral rights.—Jefferson Mining Company v. Anchoria-Leland Mining & Milling Company (75 *Pacific Reporter,* 1070); Supreme Court of Colorado.

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Parties Having Notice Bound by Issuance of Patent.—Under the law of the United States governing application for mining patents, and providing for notice, which is equivalent to a summons in a judicial proceeding, owners of a claim overlapping on the surface, having a portion of the apex in the same vein, who fail to make any protest to the application are concluded by the patent issued by the land department as fully as if an adverse had been filed and suit in support thereof had been brought and determined against the adverse.—Jefferson Mining Company v. Anchoria-Leland Mining & Milling Company (75 *Pacific Reporter,* 1071); Supreme Court of Colorado.

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Mining Law of the Dominican Republic.—United States Consul-General T. C. Dawson reports that, on May 25, 1904, a new mining law was adopted by the provisional government then in power in Santo Domingo. In framing it, the Mexican law was largely used as a model, and the advice of gentlemen experienced in obtaining mining concessions in various countries was taken. Among its most noteworthy provisions are:

1. That any one, native or foreign, may take out a permit to prospect on private property on making a deposit to cover damages caused by his operations.

2. That the owner of the land shall have a preference for a period of only two months, and, if he avails himself of it, must repay the prospector all disbursements already made, plus one-third of the value of the whole mine.

3. That applications for mining concessions are to be made to the provincial governor, who, on proof that 30 days' notice has been published, and in case the application covers private land that the owner has been personally notified, must, of course, certify the papers to the minister of industry for issuance of the concession.

4. That in case the application covers property held in common, and is made by one of the joint owners, no personal notice need be given to the other joint owners, who naturally have no right of preference. This provision is especially important, since most of the land in the mining regions is held in common, and shares therein are constantly bought and sold. The acquirement of a share, no matter how small, by a prospector, would give him right to apply for a concession which could not be interfered with by the other joint owners.

5. That the concessionaire may occupy all land necessary for buildings, roads, etc.

6. That miners are exempt from export duties and all taxes, except 60c. per acre annually in case they are mining for precious metals, and half as much when they are mining for other minerals.

## MINING AWARDS AT THE LOUISIANA PURCHASE EXPOSITION.

The following is a list of the awards made by the juries in the Department of Mining and Metallurgy at the Louisiana Purchase Exposition in St. Louis. We give in the first place the awards made to exhibitors resident in the United States:

### GROUP 115—GRAND PRIZES.

A. Leschen & Sons Rope Company, St. Louis, operating plant of wire rope tramway.

J. George Leyner Engineering Works Company, Denver, compressors, air drills and hoisting machinery.

### GROUP 115—GOLD MEDALS.

Pittsburg Coal Company, Pittsburg, model of coal mine and surface plant.

General Electric Company, Schenectady, N. Y., electric mine locomotive.

Baldwin Locomotive Works, Philadelphia, electric mine locomotives.

De Laval Steam Turbine Company, Newark, N. J., steam turbine connected to centrifugal pumps.

William Ainsworth & Sons, Denver, assay and analytical balances.

Salt Lake Hardware Company, Salt Lake, Utah, analytical balances.

Keystone Driller Company, Beaver Falls, Pa., well-drilling machinery and appliances.

American Diamond Rock Drill Company, New York, diamond drilling machinery.

Lidgerwood Manufacturing Company, New York, mine and quarry hoists.

Trenton Iron Company, Trenton, N. J., wire rope tramway appliances.

Keuffel & Esser, New York, mine surveying instruments.

W. & L. E. Gurley, New York, surveying instruments.

Denver Fire Clay Company, Denver, exhibit of clay goods for assay purposes.

Austin Manufacturing Company, Chicago, well-drilling machinery and appliances.

St. Louis Well Drilling Machinery and Tool Company, St. Louis, well drilling machinery and appliances.

Watt Mining Car Wheel Company, Barnesville, Ohio, mine cars and car wheels.

Jeansville Iron Works, Hagerstown, Pa., mine and quarry pumps.

E. G. Harris, Rolla, Mo., working plant of Harris pneumatic pumping system.

### GROUP 116—GRAND PRIZES.

American Coal Products Company, New York, coal by-products.

Solvay Process Company, Syracuse, N. Y., salt and by-products.

Tiffany & Co., New York, gems and precious stones.

Northwestern Terra Cotta Company, Chicago, collective pavilion and terra cotta.

Pike Manufacturing Company, Pike Station, N. H., abrasives.

Standard Oil Company, New York, petroleum (crude and refined).

United States Gypsum Company, Chicago, gypsum and its products.

Association of Portland Cement Manufacturers, collective exhibit of cement materials and their utilization.

Fairmont & Consolidation Coal Company, New York, coals and coal mining.

Pittsburg Coal Company, Pittsburg, coal and coal mining.

### GROUP 116—GOLD MEDALS.

Cleveland Cliffs Iron Company, Cleveland, Ohio, charcoal iron industry.

Stonega Coke & Coal Company, Stonega, Va., coal and coke.

Rookwood Pottery Company, Cincinnati, architectural tiles, etc.

Beaver Falls Art Tile Company, Ltd., Beaver Falls, Pa., enameled and glazed tile industry.

Matthews Consolidated Slate Company, Boston, slates.

J. S. Moyer & Co., Bethlehem, Pa., slate.

Vermont Slate Company, Zanesville, Ohio, slate.

Cleveland Stone Company, Cleveland, Ohio, grindstones.

Howard & Moss, Brooklyn, N. Y., cement-testing sieves.

Blue Ridge Enameled Brick Company, Newark, N. J., enameled brick.

Tinius Olsen, Philadelphia, Pa., automatic tensile cement-testing machine.

Falkenau-Sinclair Machine Company, Philadelphia, Pa., machine for testing cement.

Lehigh Portland Cement Company, Allentown, Pa., cement and products.

Hennebique Construction Company, New York, system of cantilever beam stairs for cement construction.

Parker Russell M. M. Company, St. Louis, fire brick and gas retorts.

Laclede Fire Brick Company, St. Louis, fire brick, tile, etc.

Evans & Howard Fire Brick Company, St. Louis, culvert and sewer pipes, fire brick, etc.

Winkle Terra Cotta Company, St. Louis, terra cotta.

Eimer & Amend, New York, radium, radium minerals, etc.

Great Northern Portland Cement Company, Baldwin, Mich., cement and products.

Quincy Mining Company, Hancock, Mich., copper ores and products.

American Tripoli Company, Seneca, Mo., tripoli.

Vulcanite Portland Cement Company, Philadelphia, cement and products.

Atlas Portland Cement Company, New York, cement and products.

American Cement Company, Philadelphia, cement and products.

North Carolina Talc & Mining Company, Hewitt, N. C., talc and manufactured products.

Boston & Montana Consolidated Copper & Silver Mining Company, Butte, Mont., silver and copper ores.

Tiffany Enameled Brick Company, Momence, N. Y., enameled brick and tile.

Herbert H. Hughes, St. Louis, method of coal combustion.

Helderberg Cement Company, Albany, N. Y., cement and products.

Davis Colliery Company, Elkins, W. Va., coal and model of surface workings.

Cyrus Borgner, Philadelphia, fire brick and other refractory materials.

### GROUP 118—GRAND PRIZES.

Allis-Chalmers Company, Chicago, mining machinery and metallurgical equipment.

Bethlehem Steel Company, South Bethlehem, Pa., heavy ordnance, special steel castings and forgings.

Goldschmidt Thermit Company, New York, welding process, equipment in operation.

International Nickel Company, New York, nickel, nickel steel, nickel alloys, copper.

Manganese Steel Safe Company, New York, manganese steel castings, safes and vaults.

Pittsburg Reduction Company, Pittsburg, aluminum and its products.

Norton Emery Wheel Company, Niagara Falls, N. Y., a new artificial abrasive, alundum.

Taylor Iron & Steel Company, High Bridge, N. J., manganese steel and its uses.

Worth Bros. Company, Coatesville, Pa., steel plates, boiler heads, etc.

Morgan Construction Company, Worcester, Mass., rolling mills, flying shears, gas producer, &c.

E. G. Acheson, Niagara Falls, N. Y., artificial graphite and carborundum.

Julian Kennedy, Pittsburg, blast furnace and rolling mill construction.

Austin Manufacturing Company, Chicago, ore crushers and handling equipment.

Lanyon Zinc Company, St. Louis, metallic zinc in architectural and other forms.

### GROUP 118—GOLD MEDALS.

Alaska Tin Mining Company, Providence, Alaska, tin ores.

Appliance Manufacturing Company, Chicago, differential draft gauge.

Baker & Co., Inc., Newark, N. J., platinum.

Carborundum Company, Niagara Falls, N. Y., carborundum.

Cleveland Cliffs Company, Cleveland, Ohio, charcoal blast furnace products and model.

Colorado Iron Works, Denver, Colo., Bartlett concentrating tables, five-stamp mill.

Glasgow Iron Company, Pottstown, Pa., flanged and pressed open-hearth steel.

Heine Boiler Company, New York, boilers in coal-testing plant.

Hohman & Mauer Manufacturing Company, Rochester, N. Y., thermometers in coal-testing plant.

Lawrenceville Bronze Company, Pittsburg, Pa., bronze castings.

Link Belt Machinery Company, Chicago, coal-washing jig.

Mesta Machine Company, Pittsburg, Pa., photographs and steel castings.

Obermayer & Co., Cincinnati, Ohio, facing, molders' tools and general foundry supplies.

Rogers, Brown & Co., St. Louis, twenty makes of pig iron.

Western Forge Company, St. Louis, mill stamp and die forgings.

Granby Smelting & Refining Company, St. Louis, lead and zinc ores and products.

Robt. M. Thompson, New York city, historical exhibit of uses of nickel.

Wetherill Separator Company, New York city, magnetic separator.

Jos. Wharton, Philadelphia, historical nickel exhibit.

Whiting Foundry Equipment Company, Harvey, Ill., cupolas, electric cranes, cook ovens, etc.

R. D. Wood & Co., Philadelphia, gas producer plant.

Boston & Montana Company, Butte, Mont., copper concentrates and products.

F. W. Braun & Co., Los Angeles, Cal., laboratory equipment.

United Verde Mining Company, Jerome, Ariz., copper concentrates and products.

Washoe Copper Company, Deer Lodge, Mont., copper concentrates and products.

Anaconda Copper Mining Company, Anaconda, Mont., ores, concentrates and copper.

Robins Belt Conveying Company, New York, belt conveyors.

C. O. Bartlett & Sons Company, Cleveland, Ohio, rotary dryer.

Western Carbonic Gas Company, Sacramento, Cal., magnesite.

American Concentrator Company, Joplin, Mo., concentrators, separators, milling machinery.

Carizzo Copper Company, St. Louis, antique copper melting process.

E. T. Fairbanks & Co., Chicago, foundry scales.

Freeman & Stephens, Joplin, Mo., 60-ton ore dressing mill.

Primos Chemical Company, Primos, Pa., samples of rare metals and their salts.

Edgar A. Weimer, Lebanon, Pa., slag ladle and car.

Christopher & Simpson, St. Louis, structural iron work and castings.

Alaska Treadwell Gold Mining Company, Treadwell, Alaska, statistical exhibit.

Arthur Fritch Foundry & Milling Company, St. Louis, mining, milling and crushing machinery.

J. H. Williams & Co., Brooklyn, N. Y., drop forgings.

Joshua Hendy Machine Company, San Francisco, complete gold milling plant.

Quincy Mining Company, Hancock, Mich., copper ore and products.

H. Mueller Manufacturing Company, Decatur, Ill., iron and brass castings.

National Lead Company, St. Louis, lead pipe and bars.

GROUP 119—GRAND PRIZES.

United States Geological Survey, Washton, publications.

American Institute of Mining Engineers, New York, publications.

THE ENGINEERING AND MINING JOURNAL, New York, including 'The Mineral Industry,' publications.

The *Iron Age*, New York, publications.

Geo. Frederick Kunz, New York, publications, gems and precious stones.

David T. Day, Washington, publications, mineral statistics.

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A partial list of the awards to foreign exhibitors, so far as announced, is given as follows:

BELGIUM, GROUP 116, GRAND PRIZES.

Société Anonyme des Acieries d'Angleur, Tilleur, structural steel.

Société Anonyme d'Ougrée Marihaye, Ougrée, structural steel and plate.

BELGIUM, GROUP 118—GOLD MEDALS.

Gustav Boel, a la Louvière, structural steel.

Société Anonyme á la Fabrique de Fer de Charleroi á Marchienne, fabrique de Fer de Charleroi, Marchienne au Pont, album of machinery.

Société Anonyme des Forges de Clabecq et Clabecq, Forges de Clabecq et Clabecq, albums, samples, broken bars.

Société Generale de Laminage Annulaire pour la Fabrikation des Chaines sans Soudure, Brussels, specimens, pamphlets, photographs.

Société Anonyme Minere et Metallurgique de Monceau St. Fiacre, Monceau sur Sambre, albums, notes, drawings, specimens.

Société Anonyme des Usines a la Cuivre et a Zinc de Liège, Liège, copper and zinc bars, etc.

Société Anonyme des Usines et Fonderies de Baume et Marpent, Haine St. Pierre, structural steel.

Velare Mabille in Mariemont, Mariemont, railway rolling stock.

BRAZIL, GROUP 116—GRAND PRIZES.

Ministro Da Industria e Viacao, Rio de Janeiro, collective mining exhibit.

Commissao Do Estado de Minas Geraes, Curo Preto, Minas Geraes, ores and minerals.

Usina Wigg, Minas Geraes, manganese ores.

Companhia Morro da Mina, Minas Geraes, manganese ores.

Commissao do Estado Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, marbles, ores and minerals.

Sociedade Bom Retiro, S. Gabriel, Rio Grande do Sul, wash gold, gold and iron ores and marble.

Brazilian Diamond Fields Corporation, Ltd., Bahia, gravels.

Usina Esperanca, Esperanca, Minas Geraes, iron ores.

Fabrica de Ferro Ipanema, Ipanema, Sao Paulo, iron ores, clays, etc.

Companhia de Manganez, Queluz, Minas Geraes, manganese ore.

CANADA, GROUP 116—GRAND PRIZE.

Canadian Copper Company, Sudbury, Ontario, nickel ore and products.

CHINA, GROUP 118—GOLD MEDAL.

Imperial Provincial Government of Hupeh, Peking, iron and steel.

CUBA, GROUP 116—GOLD MEDAL.

Spanish-American Iron Company, Santiago, iron ores.

FRANCE, GROUP 118—GRAND PRIZES.

Société Electro-Metallurgique Francaise de Froges, Froges, Isere, aluminum iron, its alloys and steel made in the electric furnace.

Dubois, Pinard & Cie, Sougland, par Saint-Michel, Arsne, enameling furnace and products.

FRANCE, GROUP 118—GOLD MEDALS.

Edouard Plichon et ses fils, Paris, castings of iron and steel for automobiles.

Société Métallurgique de Perigord, Paris, cast iron pipes and castings.

Louis Pinchart-Deny, Paris, perforated metal plates.

Paul Huh, Paris, saw blades and tools.

Hinque, Marret et Bonnain, Paris, rare metals.

Société Anonyme Electro-Metallurgique, D'Albertville, Savoie, alloys of iron and steel from the electric furnace.

GERMANY, GROUP 118—GRAND PRIZE.

Bochumer Verein fuer Bergbau und Gusstahl Fabrikation, Bochum, steel balls.

GREAT BRITAIN, GROUP 118—GRAND PRIZE.

Birmingham Metal & Munition Company, Limited, Birmingham, solid drawn cartridge cases, etc.

GREAT BRITAIN, GROUP 118—GOLD MEDALS.

Lileshall Company, Ltd., Oakengates, iron ore, pig iron and cable iron.

Monk Bridge Iron and Steel Company, Leeds, samples pig iron, refined iron, bar iron, steel axles.

Sherard Cowper-Cowles & Co., England, specimens of electro-galvanizing.

Farnley Iron Company, Leeds, iron ore and coal.

GREAT BRITAIN, GROUP 119—GRAND PRIZE.

Iron and Steel Institute, London, publications.

MEXICO, GROUP 118—GOLD MEDALS.

Museo Nacional de Artilleria, Mexico, rifles, carbines, fuses and grenades.

Manuel Mondragon, Mexico, Mondragon's breech block.

Compania Fundidora de Fierro y Acero de Monterey, Nueva Leon, steel and iron manufactures.

Arsenal Nacional, Vera Cruz, patterns for ordnance castings.

Fabrica Nacional de Armas, Mexico, ordnance.

Fundicion Nacional de Artilleria, Mexico, ordnance and other castings.

Maestranza Nacional de Artilleria, Mexico, mountain gun and mortar.

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## PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

*Week Ending October* 18, 1904.

772,354. ELECTRIC FURNACE.—Henri Harmet, St. Etienne, France. An electric furnace having at its base an enlarged crucible-chamber, a series of electrodes penetrating said crucible-chamber and forming the poles of an electric current, a discharge from said crucible-chamber, means for conveying gas under pressure from the mouth of the furnace into the crucible chamber adjacent to the electrodes, a refining-oven and means derived from the electric current for heating said oven, said refining-oven arranged adjacent to the discharge of the crucible-chamber of the furnace.

772,361. PLUNGER-ELEVATOR.—Fred A. Jones, Worcester, Mass., assignor of two-thirds to William E. D. Stokes, New York, N. Y., and Thure Larsson, Worcester, Mass. In a hydraulic elevator, the combination of a car mounted on separated cross-beams, a socket-plate secured to said cross-beams, a depending plunger carried by said socket-plate, transverse beams supported by said first-mentioned beams, and a cable attached to said plunger and to a rod carried by said transverse beams.

772,377. SEPARATOR OR GRADER.—Charles T. Rowland and Lewis F. Longmore, Lowell, Mass.; said Longmore assignor to said Rowland. The combination of two or more successively-arranged oppositely-inclined trunks, each having a screen-surface on its upper side, adapted to discharge matters placed thereon and coarser than the meshes of such screen upon the next following screen, and break-pieces, having points and arranged between successive screen-surfaces, to be struck by and to reduce matters discharged from one screen-surface to the next.

772,389. ORE DRAINAGE AND LEACHING TANK.—Jean F. Webb, Denver, Colo. In a metallurgic-filter, an outer imperforate tank separated by an annular space from an inner drainage and leaching tank with perforated sides and bottom covered with suitable filters, and having within its circumference the perforated lower end of a hollow compartment or stand-pipe through which liquids or compressed air may be introduced into said tank and forced by pressure to pass outwardly through the filters and perforations thereof, and having pipes through which the flow of such liquids or compressed air may be reversed from the said hollow compartment or stand-pipe into the said annular space and be forced by pressure to pass inwardly through the perforations and filters of said tank.

772,390. SATURATING APPARATUS FOR RECOVERING AMMONIUM SULPHATE.—Karl Zimpell, Stettin, Germany. Improved saturating apparatus for the recovery of sulphate of ammonia comprising in combination a large closed saturating vessel, a downwardly-projecting cylinder in an opening of the top plate of said saturating vessel, a second saturating vessel of smaller diameter than the cylinder in the top end of said cylinder, a cover closing said second saturating vessel and the cylinder, a supply-pipe downwardly projecting through the center of the cover and bottom of the second saturating vessel reaching below the end of said cylinder, openings in the wall of the second saturating vessel near the top edge of the same,

bent pipes projecting from said openings into the second vessel below the level of the acid contained in the same, an overflow in said second vessel, an outflow for the waste gases on the cover of said second vessel and a funnel for filling the acid into said second vessel.

772,440. ART OF CASTING METALS.—Charles S. Székely, Sr., New York, N. Y., ssignor, by mesne assignments to The Metal Casting Company of America. Improvement in the art of casting iron and steel in metal molds, which consists in first coating the interior surfaces of the mold with a coating-wash composed of an inert inorganic substance which will have no chemical action on either the metal of the mold or the metal of the casting, and a vehicle of paraffin and kerosene or their equivalents, then closing the mold, and then filling the latter with the molten metal.

772,472. FILTER-PRESS.—James W. Neill, Salt Lake City, Utah. In a filter-press, the combination of a cylinder adapted to contain the material to be filtered, a plunger working therein, means for reciprocating the plunger, means for reciprocating the cylinder, a valve controlling the passage of the material to be filtered to the interior of the cylinder and means actuated by the plunger for opening and closing said valve.

772,523. CEMENT.—Agostino Lamanna, Baltimore, Md. An artificial stone, cement or other product, consisting of the following elements combined in substantially the parts, weights or proportions named. Two parts of pozzuolana (or pozzolana) earth, one part of lime, two parts of crushed stone (or a like quantity of sand in lieu of such crushed stone when used as a mortar or plaster) and to every bushel of such mixture 2 lb. of rock-salt.

772,532. CENTRIFUGAL OR SIMILAR PUMP.—Frederick Ray, East Orange, N. J., assignor to Henry R. Worthington, New York, N. Y. In a centrifugal or similar pump, the combination with the rotary impeller having its suction at the hub on one side of openings at the impeller-hub for admitting fluid to the back of the impeller, a running joint on the back of the impeller outside said openings, a chamber on the back of the impeller outside said joint, and vanes carried by the impeller running in said chamber.

772,540. CONCENTRATOR.—Charles A. Smith, Los Angeles, Cal. A concentrator-table elevated in the longitudinal center thereof, and having ports in its longitudinal center; riffles on the top of the table leading downwardly from the sides thereof to a point adjacent to the center; the riffles being low at the outer end and high at the inner end; and means to regulate the openings in the center for the discharge therethrough of the concentrates from the table as they are separated from the gangue, and means to give a longitudinal swinging motion to the table.

772,555. AUTOMATIC CAR-DOG FOR CABLE MINE-HAULS.—Carson W. Damron, Fairmont, W. Va., assignor to The Wagner-Palmros Manufacturing Company, Fairmont, W. Va. In a cable-haul, a dog for connecting a car thereto, comprising a pair of pivoted arms independently movable by impact of the car against them and means resiliently holding the arms in engaging position.

772,563. MACHINE FOR FORMING CONCRETE BUILDING-BLOCKS.—Robert T. Frost, Dows, Iowa, assignor to the Frost Concrete Stone Company, Dows, Iowa. A machine for forming concrete building-blocks, consisting of a combination of adjustable sectional mold-plates, centrally pivoted to a bed-plate, and drop sides hinged to the edges of said bed-plate.

772,569. CONVEYER.—Orlando Kling, Denver, Colo., assignor of one-half to Herbert George, San Francisco, Cal. In a conveyer, in combination, moving trucks or supports, receptacles movable independently of and mounted upon said supports or trucks, means for automatically tilting the receptacles while moving, and means coöperating with the bodies of the moving trucks or supports during their travel to prevent tilting thereof during the tilting movement of the receptacles.

772,606. POWDERED-FUEL-FEEDING DEVICE.—Charles Brossmann, Jr., Indianapolis, Ind. A powdered-fuel-feeding device consisting of a feeding-fan with a hollow center having a fuel-feeding aperture associated therewith, a fuel-conveyer apparatus which delivers the fuel in such hollow center opposite the feeding-aperture, said aperture arranged for discharging it outwardly to the fan-blades.

772,612. METHOD OF DECOMPOSING REFRACTORY SILICATES.—William T. Gibbs, Buckingham, Canada. A method of decomposing refractory silicates, which consists in treating the silicate with a decomposing solution containing a catalytic agent and a reagent that will combine with the base or bases and leave the catalytic agent free for further action.

772,621. CLAY-GRINDING PAN.—Daniel F. Lepley, Connellsville, Pa. The combination with a grinding pan, of a pivotally-mounted dipper, means for actuating the dipper, and means for suddenly checking the dumping movement thereof to thereby eject the contents of the dipper.

772,635. CEMENT-BRICK-MAKING MACHINE.—Ora Staley, Charlottesville, Ind. In a brick-making machine, the combination of a pair of annular heads, a plurality of mold-bars connecting the same and having open-ended molds formed radially therein, of a radially-movable bottom bar arranged adjacent each mold-bar and provided with projections projecting into the inner ends of the molds, means for advancing the heads step by step, a pressure-frame consisting of an outer pressure-bar adapted to enter the outer ends of the molds, and an inner pressure-bar adapted to engage the bottom bars for moving both the outer pressure-bar and the bottom bar with relation to the mold, a receiving-board chute, means for associating a receiving-board with each filled mold, a pair of receiving-tracks, means for engaging the bottom boards and projecting the same radially outward to discharge the finished bricks from the molds, means for further retracting the tracks so as to retract the finished bricks from the bottom boards, and means for discharging the brick-carrying boards from the machine.

772,639. HOISTING-ENGINE.—James N. Wright, Newark, N. J., assignor to Joseph S. Mundy, Newark, N. J. A hoisting-engine, in which is combined with the bed or frame and the hoisting apparatus, a mast-rope drum and drum-shifting means comprising connected compound levers at opposite sides of said frame, and plates stationed at opposite ends of said drum, and means operated simultaneously by said connected levers and adapted to press one of said plates against the drum and release the other of said plates from said drum.

772,642. FACE-PLATE FOR GRINDING-MILLS.—Oma Carr, Buena Vista, Va. A grinding device consisting of a disk, a removable face-plate, and removable rotatable breakers or grinding devices removably secured to the face of the disk by the face-plate.

772,657. PROCESS OF DECOMPOSING REFRACTORY SILICATES.—William T. Gibbs, Buckingham, Canada. A method of decomposing refractory silicates, which consists in reducing the silicates to a finely-divided condition and removing the bases from their combination with the silica by combining them with hydrofluosilicic acid.

772,661. ELECTRICALLY-CONTROLLED TRAP-DOOR FOR MINES OR TUNNELS.—Joseph Krzyzanowski and Stanislaus Wysocki, Juzowka, Russia. In an electrically-controlled trap-door, the combination with a frame secured in the walls of a gallery, of a trap-door on said frame, means for normally holding said trap-door in its opened position, an electric motor secured on said frame, means for closing said trap-door on said electric motor being actuated, an electromagnet secured on said frame, the armature of which is affixed on said trap-door, a circuit connecting said electric motor and the coil of said electromagnet with a central station, and means for switching said electric motor out of and the coil of said electromagnet into the circuit as the trap-door closes.

772,699. BALL GRINDING-MILL.—Meyer J. Davidsen, Copenhagen, Denmark. A ball grinding-mill, consisting of a drum provided at some distance from its ingoing end with a row of openings, a screen extending beyond said row of openings and beyond the opposite end of the drum, a deflector on the shaft of the drum adjacent to the head of the same, apertures in said head adjacent to the deflector for returning the tailings for regrinding them in the end of the drum opposite to the ingoing end without mixing them with the material fed at the ingoing end of the drum.

772,723. BLAST-FURNACE.—Andrew Latto and James C. Callan, Braddock, Pa. The combination with a blast-furnace, of a conduit communicating with the blast-furnace near the top thereof, and a dust-collector composed of a curved elbow, a downwardly-extending tube, angularly-disposed plates arranged in said elbow and having spaces between the plates communicating with the open air.

772,728. OIL-WELL PACKER.—Joseph E. Merritt, Bakersfield, Cal. In an oil-well packer, a support comprising a sleeve having seats in its outer face, said seats being provided with inclined walls, vertically-sliding tube-engaging jaws arranged in the seats, springs located below the jaws for elevating them, and holding devices extending across the sleeve and detachably engaging the jaws to hold the same in lowered position against the action of the springs.

772,734. GATHERING-LOCOMOTIVE FOR MINE-HAULAGE SYSTEMS.—Edmund C. Morgan, Chicago, Ill. In a gathering-locomotive, a gathering-conductor, a drum upon which such conductor is wound, and means independent of the locomotive truck-wheels for actuating said drum.

772,779. GAS-WASHER.—Friedrich Burgemeister, Celle, Germany. The combination with a vessel, of a plurality of successively-effective spraying devices, each presenting a convex imperforate surface for the lodgment of a liquid and provided with an inwardly-sloping under surface.

772,804. STAND-PIPE CONNECTION FOR OIL-WELLS.—John A. Hooper, Southard, Pa. The combination with an oil-well tube, of a stand-pipe separate from the oil-well tube, a flexible connection connecting the adjacent ends of the stand-pipe and the oil-well tube and holding them out of engagement, a walking-beam, and a polish-rod passing through the stand-pipe and connected with the pumping apparatus.

772,846.—GAS-SEAL FOR METALLURGICAL FURNACES.—Samuel Stewart, Brighton, and Harry Hughes, Woodward, Ala. A gas-seal for metallurgical funaces, comprising a plurality of sliding gates tapered at the ends to fit snugly together when in the closed position, a series of shafts geared together, and a crank on each shaft pivotally connected to one of said gates, and means for rocking one of said shafts.

772,860. SEPARATOR.—Frederick H. Bemis, Bingham Canyon, Utah, assignor of two-thirds to Enos A. Wall and George L. Bemis, Salt Lake City, Utah. A separator, comprising an inclined spring-supported screen-carrying frame pivoted at its lower or tail end in fixed bearings, means for depressing and suddenly releasing said frame and a rigidly-secured bumper or contact-piece at the head end to check the upward throw thereof.

772,862. PROCESS OF ELECTRICALLY TREATING GASES.—Kristian Birkeland, Christiania, Norway. A process which consists in establishing an electric arc, creating a magnetic field adapted to disperse or spread said arc and passing a current of gas or gases past and in contact with said arc.

772,880. PUMP.—Samuel M. Fulton, Pomona, Cal. In a pump, a piston-frame provided upon its upper face with a bearing-seat, a hub within said frame disposed below said seat and having a valve-seat upon its upper face, radiating spokes from said hub having a threaded face at their free ends, pickings secured to said face, and a valve carried by a stem from said hub and having faces in different horizontal planes to contact with said seats.

772,891. PROCESS OF REMOVING WATER FROM PEAT.—Bernhard Kittler, Memel, Germany. A process for treating peat which consists in agitating the same and subjecting it to the simultaneous action of an electric current and a vacuum.

## GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

*Week Ending October* 1, 1904.

22,767 of 1903. OPEN-HEARTH STEEL MAKING.—B. Talbot, Leeds. In the duplex system of making steel in the open-hearth process, improvements in the arrangement of the two hearths so that fewer men are required to work them.

23,145 of 1903. ZINC ALUMINUM ALLOY.—P. and A. Gührs, Berlin, Germany. Mixing some aluminum with zinc to make it more serviceable in galvanizing by the prevention of the formation of hard zinc or oxide of zinc.

23,259 of 1903. COAL-WASHING SYSTEM.—C. J. Kremer, Dortmund, Germany. A coal-washing system in which the smaller coal is eliminated at the first washing and afterwards washed separately, thus avoiding screening before washing and the loss of material.

23,535 of 1903. OILER FOR ORE BREAKERS.—J. Thomas and J. Foster, Leeds. An improved oiling apparatus for the eccentric shafts of ore breakers.

10,176 of 1904. MELTING FURNACE.—L. Rousseau, Paris, France. Improved portable furnace for melting metals.

15,392 of 1904. DEEP BORING MACHINE.—W. Wlodarczyk, Boryslaw, Austria. Improvements in deep boring machines, so as to adapt the tension of the springs to the varying strain on the drill chain.

16,448 of 1904. REFINING IRON.—H. Harmet, St. Etienne, France. Refining cast iron by spraying it through a nozzle with hot-air blasts.

## SPECIAL CORRESPONDENCE

**San Francisco.** Oct. 20.

The 13th annual convention of the California Miners' Association has been called by the executive committee to meet in San Francisco December 5, to continue six days. This widely-known association of mining men is in a transition stage, a fact which will probably be emphasized by marked departures at the meeting this year. The most notable feature of the proceedings, of general interest, according to the expectations of Secretary Edward H. Benjamin, will be the numerous technical and practical papers by well-known California mining engineers and operators which will be read or presented by title and subsequently published. Such papers have been presented at recent former conventions, notably the last two, but they have been theoretically incidental to the business of the conventions. This year the executive committee is arranging the convention on the theory that the association should become a semi-technical society, making helpful discussions of mining conditions and practice a leading purpose of the association and giving it a new motive and a new spirit. The prolonging of the meeting from the usual three days to six is another innovation. It is proposed to devote the forenoons to the meetings and the afternoons to trips to near-by points of interest, including the plants of the Risdon Iron Works, the Union Iron Works, and the Selby Smelting Co., the Mare Island Navy Yard, etc. The future basis and policy of the association will likely be a prominent subject of discussion and legislation.

Northern California is displaying much more activity in the prospecting and development of mining properties than any other section of the State. In western Siskiyou and northern Trinity counties many promising new mines are being developed, and the sale and bonding of mines is reported oftener than from any other section. The backwardness of this region has been due mainly to the lack of transportation facilities and the difficulties of a remote and rugged country, but the jumbled mountains are filled with quartz veins which are developing good values in many districts, and the mines now being opened and equipped are stimulating inquiry and investment. This whole region is favored by an abundance of timber and water.

The recent developments at Goldfield and adjacent camps have awakened much interest in western Nevada, in San Francisco mining circles, and this city will be intimately connected with the future development of that field and of the southern part of that State, soon to be opened to mining enterprise by the completion of Senator Clark's San Pedro, Los Angeles and Salt Lake railroad. The preliminary excitement over Goldfield is stimulating prospecting and legitimate investment throughout that region, and California men and money are figuring largely in these developments. What success will follow the listing of Tonopah and Goldfield mining stock by the San Francisco Stock Exchange remains to be seen. In San Francisco general interest in mining stock speculation has mainly passed with the departed glory of the Comstock.

The announcement that the stock of the recently incorporated Mammoth Mining Co., which has bought the Mammoth group of claims in the copper belt of Shasta county, is to be absorbed by the United States Mining Co., of Boston, inspires here further confidence in the report that a large mining and smelting plant is to be erected by the company. The latter company has issued 60,000 shares to be exchanged, share for share, for the stock of the Mammoth company. About 31,000 shares will be offered pro rata to the United States shareholders at $20 per share, and the directors will take all of this stock not taken by other shareholders. Great expectations have been raised at different times in the past few years by deals and negotiations involving some of the large groups of claims in this belt, in which immense reserves of low-grade ore have been developed, but the Iron Mountain and Bully Hill are as yet the only producers. That this property has been taken by the heaviest shareholders of a corporation so extensively engaged in the Utah mining field and is to be so closely merged with the interests of that company is taken as evidence that the buyers mean business, and that there is a good prospect that another notable copper mine will before long add to the mineral output and prosperity of Shasta county.

The Keystone mine, at Amador City, is the latest of the large mother lode mines to substitute oil fuel for wood. A reservoir and oil burning plant are being put in. The Kennedy, Oneida, Central Eureka and other important mines along this section of the mother lode have been burning oil with economic success for two or three years, with about 12 miles of haulage from the railroad at Ione. When the electric railroad now being built from Ione to Jackson is completed the cost of oil and other mining supplies will be lessened. Elsewhere in California fuel oil is being extensively used at mining plants.

The New York-Grass Valley Mining Co., operating exclusively in Nevada county, has elected the following officers for the ensuing year: A. M. Duncan, president; Edwin Fernald, vice-president; J. W. Heisner, secretary; Captain A. Anderson, treasurer; G. W. Root, manager, and the above named, with Charles Haseltine, G. W. Boole, J. A. Orr and S. C. Kaye, as directors. A slime plant for tailing and an electric lighting plant are to be installed. The company's property includes 720 acres of patented mining ground; it has no indebtedness, and the operations are profitable.

The acid-making plant, near Berkeley, in San Francisco bay, formerly operated by the San Francisco Chemical Co., and recently purchased by the Mountain Copper Co., to better utilize a portion of its sulphide ores, was burned last week, entailing a loss of $10,000. The plant will be rebuilt at once.

The property of the Mammoth Copper Co., in Shasta county, which has been closely merged with the interests of the United States Mining Co., was visited a few days ago by Albert F. Holden, of these companies, and it is reported that a site for a 500-ton smelter will soon be decided upon. It is understood that the smelting plant will be located near Kennet, by the railroad and the Sacramento river, and that an electric road from Redding will follow. Definite information as to the plans by which this important property will be made productive is awaited with interest.

**Denver.** Oct. 22.

A few miles west of Trinidad an attempt to destroy a railroad bridge of the Colorado & Wyoming railroad, the property of the Colorado Fuel & Iron Co., by dynamite was made recently. Although the bridge was seriously damaged, the attempt may be called unsuccessful, as traffic was not interrupted to any serious extent. Only a short time before the explosion occurred, a train, on which a large number of miners were passengers, had passed. The authorities are making an investigation.

At the long-looked-for meeting of the Colorado Fuel & Iron Co. the reorganization was made without dissension. About $8,000,000 will be expended in much-needed improvements which President Hearne considers necessary at the Minnequa plant. When the proposed improvements are completed a much larger number of workmen will be employed. Another large blast furnace will be built, the tin plate mills will be completed, a new merchant mill erected, and the capacity of the pipe foundry will be doubled and that of the rail mill increased. The board of directors is made up entirely of Rockefeller-Gould men, as follows: George J. Gould, Fred T. Gates, James H. Hyde, Edwin Hawley, J. D. Rockefeller, Jr., E. P. Prentice, J. H. Clement, E. H. Harriman, F. J. Hearne, E. W. Oglebay, Benjamin Nicoll, D. C. Beaman and Starr J. Murphy. The last two gentlemen were elected to succeed J. C. Osgood, who resigned, and J. A. Kebler, who died a short time ago. Mr. Osgood was one of the so-called "Big Four," with Mr. Kebler, Mr. Beaman and Mr. R. M. Hosea, who founded and built up the company.

At the annual meeting of the stockholders of the Denver & Rio Grande railroad, the Rio Grande Southern railway and the Rio Grande, Pagosa Springs & Northern railroad, the articles of incorporation were amended to provide for the building of two small extensions, one from Howard, along Howard creek, the other to be constructed from Sargents, in Saguache county, up Tomichi creek to White Pine, where the large iron deposits recently leased by the Colorado Fuel & Iron Co. are situated.

President Frank Trumbull, of the Colorado & Southern Railway Co., which is becoming a great factor in the transportation system of this State, has arrived in Denver from New York. He states that it is the intention of his company to put in electricity on various lines of the road, especially between Denver and Boulder.

In the federal court, the Topeka mine, owned by Tyson S. Dines and Henry P. Lowe, has been the subject of a controversy. Some time ago these gentlemen sold the property. A certain sum was paid down and notes given for the balance. The latter not being paid, suit was brought to foreclose, when the purchasers complained that the value of the mine had been misrepresented, and a cross-complaint was filed. It promises to be an interesting suit.

Señor Don Ramon Corral, vice-president of Mexico, accompanied by General Torres, Major Garcia Cuellar, Roberto Munez, under-secretary of the department of finance, and General Herino Reyes, division commander in the Mexican army, have been in Denver.

**Houghton.** Oct. 22.

The Phœnix has completed an exhaustive mill test, treating the rock from the West vein shaft and the St. Clair vein shaft separately. The result has condemned the West vein as unprofitable, and it will ultimately be closed. The copper values are decreasing with depth. The St. Clair vein shows an ample supply of profitable ground, and its permanent operation is planned.

The stockholders of the Miskwabik Development Association and the Federal Copper Co. have ratified the consolidation of the properties with a tract belonging to the Union Copper, Land & Mining Co., and the placing of the management in the hands of H. F. Fay, of Boston, president of the Union. Mr. Fay is also president of the Centennial and the Allouez. A resumption of exploration is contemplated this fall. There is a shaft down 120 feet.

The Mohawk is sinking in the ledge at the new No. 5 shaft, after penetrating 18 ft. of overburden. The disclosures so far are equal to the rich ground opened in No. 1 shaft of the Ahmeek and superior to any other showing in an amygdaloid lode of the Keweenawan series, according to the most reliable and best-informed experts.

The Calumet & Hecla, at its No. 20 shaft, on the Kearsarge lode, has connected its raise from the exploratory drift with the pit which was sunk through the overburden in the line of its permanent shaft. The overburden is 47 ft. thick, and the drift is at a depth of 100 ft. from surface.

The Tamarack has suffered a suspension at No. 5 shaft on account of a break in the large hoist. A duplicate of this hoist is nearing completion at the same shaft and will be ready for operation probably by November 1. The repairs to the injured hoist will not be completed until after that time. In the meanwhile an increase in shipments from other sources compensates in part for the shortage of rock occasioned by the delay at No. 5. A very material increase in Tamarack output is expected as soon as the two hoists at No. 5 are in full service. The new compressor, with a capacity of 100 drills, is running satisfactorily at No. 5, and the stoping ground is understood to be of a very favorable character and extensive volume. The last year has developed a decided improvement in the underground showing of No. 5.

The Calumet & Hecla is completing the foundation for an extensive electrical plant adjacent to its stamp mill at Lake Linden, on Torch lake. It is planned to introduce electrical power at practically all points of power consumption throughout the entire mining and milling systems, excepting the rock hoists and stamp heads. The approximate charge which the Calumet & Hecla makes against its various departments averages 10 cents a ton for hauling coal from the lake level at the docks

on Torch lake to the mine, with considerably more than this for the team haul necessary to supply fuel to the pumping station at the water works on Lake Superior. This charge will be eliminated when the electrical plant is in service.

The Champion mine is preparing to resume sinking in its four shafts. The development work has been confined to drifting since early in the year. There has been an inadequate supply of compressed air, but the 100-drill quadruple-expansion compressor for which the company has been waiting nearly two years is now in service. It was originally calculated that the four heads of the mill would be kept in constant service immediately after the compressor was completed. Improvements in the efficiency of the mill have, however, enabled three and one-half heads to care for the rock shipments which formerly required four heads. This enlarging of the efficiency has been general in all of the Michigan copper country mills, due to improvements introduced during the last 18 months. The Champion's rock shipments are 1,640 tons daily, and it is only occasionally that more than three heads are necessary to handle the output.

The Wyandot has abandoned explorations in the workings on Section 28, a tract which was held under option. It is preparing to sink on a newly-discovered and unidentified lode on Section 16. One-half of this section is owned by the company and one-half has been taken on option, giving a strike of over a mile to this lode diagonally across the property. The work has not progressed beyond stripping the overburden from the rock and placing a few blasts. There is a low-grade showing of copper, but it is of a character sufficiently encouraging to warrant exploration. The Wyandot has also completed the unwatering of its No. 1 shaft, which was sunk on the Winona lode to a depth of 250 ft. three years ago. There has been only a limited amount of drifting in this shaft. The success of the Winona's development has prompted a resumption of exploration at this point.

Arthur L. Carnahan.

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**Salt Lake City.** Oct. 21.

At the annual stockholders' meeting of the Ajax Mining Co. a new board of directors was chosen with the following officers: Thomas Weir, president; Henry G. McMillan, vice-president; L. H. Farnsworth, treasurer, and J. M. Burt, secretary, all of Salt Lake City. During the past year the only ore extracted was done by lessees, but the 200, 300, 400 and 1,000-ft. levels were extended 864 ft. by contract. The financial statement shows that $34,958 was received from assessments, and $30,455 was expended in payments, reducing the mortgage principal. Out of the 300,000 shares for which the company is capitalized 254,825 have been issued and 45,175 remain in the treasury.

The development of the Frisco Mining Co.'s property, near Frisco, Beaver county, will shortly begin on an extensive scale. Manager D. P. Rohlfing will instal a new hoisting plant. An extension of the famous Horn Silver ledge crosses this ground.

The work of increasing the capacity of the Yampa smelter at Bingham is progressing. The boilers for the power plant are being installed.

It is evident that a long and tedious legal conflict will be carried on between the farmers and smelting companies of the Salt Lake valley before the smelter smoke question in this region is settled. The smelting companies made a proposition to the farmers, who, at a mass meeting held at Murray on October 21, declined to accept the proposition, alleging that the smelters are only seeking delay, as they say, has been their policy in the past. Legislative, financial, judicial and other committees have been appointed, and the fight is to be carried into the courts.

The Continental Alta Mine Corporation, Henry M. Crowther, manager, has begun work on its five-mile aerial tramway, which is to be built between its mine and mill. Every effort will be made to complete the line before winter.

All the equipment having arrived, it is expected that the Columbus Consolidated Mill, at Alta, will go into commission at once.

Suit has been brought in the district court at Salt Lake by Hugo Rettich against the Superior-Alta Mining Co. to quiet title to Hellgate claims No. 2 and 4, owned by the plaintiff, and Alfred and Huron claims, owned by the defendant and situated in the Little Cottonwood mining district.

The Utah Copper concentrator, at Bingham, built at a cost of $200,000, is running with its entire equipment in commission and is turning out a product that yields from $60,000 to $70,000 monthly. The mill is producing about 1,000 tons of concentrate monthly, which carries copper values of 35 per cent. and in addition a considerable quantity of gold and silver.

The management of the Utah mine, at Fish Springs, has secured a bond on the Galena mine, an adjoining property. The bond runs for one year, and the price named is on the basis of 40 cents a share for the property.

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**Spokane.** Oct. 18.

Mere presumption that there was ore in the Minnie Moore claim, at Wardner, Ida., because there were rich deposits around it, is not sufficient to give title, according to Secretary Hitchcock, in a recent decision. He upholds the General Land Office in the protest of John Keating against the issuance of a patent. Keating alleged that it was chiefly valuable for agricultural purposes, and showed that the claim is within the limits of an incorporated town.

The Jumbo company, of Spokane, after running 450 ft., has found the Jumbo vein in its property, at Rossland, B. C. The work took six months of hand drilling. Jumbo stock has been active. John A. Finch, of Finch & Campbell, is one of the large shareholders. There is little stock on the market, and scattering blocks have sold lately above 40 cents.

The second Relief mine, near Ymir, B. C., owned by Finch & Campbell, of Spokane, was closed last week because of the drouth, but is now running.

Placer mining along the Columbia river is receiving renewed attention. P. H. Craven has taken a placer location near the international boundary and is sluicing. A small steam engine formerly used in the Spitzee mine, at Rossland, furnishes the power. Mr. Craven relies on the plates to secure all the gold, but riffles will be placed in the sluice boxes later. He estimates that the gravel carries 40 cents per yd. He believes that he is handling it for 15 cents a yard.

Charles Sweeny, president of the Federal Mining & Smelting Co. and head of the Sullivan Group Mining Co., in East Kootenay, B. C., is back from the East. He will shortly visit the mine and smelter of the Sullivan company. The furnaces and the entire plant are being rebuilt from the ground up. The machinery is being made by the Union Iron Works here. There has been considerable delay, and the plant will hardly be running before the first of the year. There is an immense deposit of solid galena and zinc in the Sullivan. In former years no effort was made to save the zinc. Now the Sullivan group company, which is receiving the attention of E. J. Roberts, is working on efforts to recover that metal. The salt-cake method is receiving attention.

The Bunker Hill & Sullivan mine, in the Coeur d'Alenes, is making the greatest record in its history. Stanley Easton, under whose capable management the property is doing so well, was in Spokane this week. Dividends are being maintained at the rate of $75,000 a month. The total output of the Coeur d'Alene mines for September was 21,749, and the output for the year to date is 177,859 tons.

The Evolution Mining Co., which recently held its annual meeting in Spokane, elected W. F. Reisland, of Spokane, as president, and F. W. Mauser, of Spokane, treasurer. The floating debt of $3,200 was cared for by the sale of treasury stock to Eastern shareholders. The mine, which was the pioneer location of the quartz lode properties in the Coeur d'Alenes, is 1,000 ft. from the Oregon Railway & Navigation Co.'s tracks at Osburn, Idaho.

The Bullion, a copper property in the Coeur d'Alenes, is driving a lower cross-cut tunnel to open the copper shoot found in the upper workings. The Bullion people are much encouraged by the success of the Snowstorm mine. The Heward company, which took a lease on workings on that property, is shipping 150 tons of low-grade copper ore daily. Facilities for doubling that output will be obtained by adding more buckets to the tram. The company reports the finding of a 30-ft. shoot of fine copper ore in the leased ground, which comprises the zone above the 600-ft. level.

Repairs on the Nine-Mile branch of the Northern Pacific railway are being made, preparatory to the resumption of shipments from the 16 to 1 mine, which is being worked, after having been tied up in litigation for years. Ore has been found in the lower west drift, where there is solid ore. The Washington Water Power Co., of Spokane, is extending its electric transmission line to the 16 to 1, for supplying power for the mill. The success of the 16 to 1 has started a number of properties on Nine Mile creek, notably the Bimetallic group which adjoins the 16 to 1 on the west and south.

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**Bisbee.** Oct. 20.

Some notable developments, in which several of the properties share, are going forward at the Calumet & Arizona group of copper mines. It looks more and more, as time passes, as though all prior expectations and prophesies as to these mines would be discounted by the realities. In Calumet & Arizona, which has been under development since 1900, the ore reserves have been materially increased within a few months, and a new mine is now being opened on the Senator claims, lying half a mile south of the Irish Mag claim, in which all the company's work has previously been done. It is probable that this mine will be at least as important as that which has been partially opened in the Irish Mag. Connecting the two properties is the Pride claim, and on the 1,250-ft. level here the company is developing what seems to be an important body of ore, while the entire area is in the formation that seems to indicate the presence of orebodies within a reasonable distance. Lake Superior & Pittsburg, owned by the same parties, has been developing an important orebody for many months. It was first cut on the 1,000-ft. level south from the Cole shaft, and was followed for about 150 ft. with a varying width up to 75 ft. It was found later on the 900-ft. level by an upraise, and has now been cut on the 1,100-ft. level and 100 ft. nearer the shaft than on the 1,000-ft. level. Assays average up to 20 and higher for the different levels. There is already great value in this orebody, and there are no indications of the discovery of its limits. At other parts of this property are indications that orebodies as large and valuable may be found.

The Pittsburg & Duluth company will be organized as a mining corporation November 1. It was first taken up and development begun in May, 1903. On one drift a large body of black oxides of copper and carbonates, as well as much native copper, has been cut within the past two weeks, and there is now a length of rich ore of about 75 ft. in this drift. Indications are for the increase of this orebody with depth, and for the discovery of other large bodies in other favorably situated portions of the property. Directors and officers of this company were elected at a meeting in Duluth, Minn., Friday. They are the same as those of all the other Bisbee companies under the same management, namely, Calumet & Arizona. Calumet & Pittsburg, Lake Superior & Pittsburg, and Junction Development. The company will have $3,000,000 authorized capital, of which $500,000 remains in the treasury, and the balance is allotted to present stockholders at the rate of two and a half shares for every one of development stock, and two and a half at $10 each to the same persons. This is the fourth of the five companies organized by these Duluth, Calumet and Pittsburg people to become a mining company, and the fifth to find ore, for the Junction also has ore in considerable quantity. This has not been exposed, but the work of diamond drills from the bottom of the shaft has disclosed the presence of good bodies of ore that should develop into something of importance.

**Goldfield.** Oct. 16.

An important strike has been made on the Cimeron fraction, adjoining the Lone Star group on the south. Two feet of talc have been opened up, which carries values above $1,000 per ton. Not an assay of many that have been made gave returns below this figure. The vein has been uncovered a distance of 250 ft. Ore is being sacked for shipment.

On the Vernal No. 1, of the Vernal company, four and a half feet of shipping ore have been opened up in the cross-cut from the 50-ft. level. The value of the ore is estimated, from careful assaying, at from $400 to $500 per ton. The strike is of particular importance, as it proves the mineral zone of the district extends a mile north of Diamondfield.

A shaft has been started on the Tonopah Club claim of the Conqueror Mining Co., upon which a very rich strike was made last week. A depth of 10 ft. has been attained, and all of the ore that is being extracted is being sacked for shipment. Assays indicate values of $300. The company is also sinking a shaft on the hanging wall, from which $125 ore is being taken out. A shipment will be made this week.

Rich pannings have been secured from the Silver Tip of the Empire company, at a point 30 ft. east of the main working shaft. The management expects to open up a very important ore-shoot in the next few days.

A 4-ft. ledge of shipping ore has been opened up in the shaft on the Spokane group. Assays returned values from $46 to $126 per ton. The property is being developed by the company.

A very important strike is reported from the Manxman fraction, at Gold Crater, belonging to Bond & Co., of this place. In a 3-ft. open-cut an orebody has been exposed from which the following assays were taken—$488.32, $72.41 and $68.

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**Dawson.** Oct. 18.

Up to the close of September the royalty tax of 2.5 per cent on gold mined in the Yukon for the month was paid on a total valuation of $859,373. The largest monthly return was $2,697,599 in June. The September returns from Forty Mile and Whitehorse have not been received, and it is believed that these and other final shipments will bring the output up to about $10,000,000 for the nine months.

New gold discoveries are reported to have been made recently on a stream tributary to the Big Delta, in the Tanana district, and a number of claims have been staked on Jarvis and McCumber creeks. The Jarvis creek claim is said to have yielded 80 cents to the pan at a depth of two feet, while good prospects were also found on other claims. The McCumber placers are said to be very shallow, the distance to bedrock being not over four to five feet.

Some intelligence regarding the value of the Beaver creek discoveries which created a stampede to the locality some months ago has been received, but although the country has been staked 50 miles square, the productive capabilities of the field have yet to be ascertained. Surface prospecting has yielded fair results—from 6 to 20 cents to the pan—and on the strength of this a number of claim owners have decided to sink on their properties during the winter.

A slight change has been made in the Yukon mining regulations by which, after this month, the cutting of wood on placer claims will not be recognized as "representation work." Heretofore the government has allowed $5 a cord as part of the annual assessment of $200, but owing to the manner in which this privilege was abused the change in question was considered necessary.

The White Channel Gold Hill Hydraulics, Ltd., recently took up 27 additional options on Gold Hill, thus increasing its holdings to nearly 50 claims. The company's new extensive water system is now completed.

The Gold Run (Klondike) Mining Co. has applied to the mining recorder at Dawson for 2,000 in. of water on Australia and Melba creeks, for the purpose of carrying it a distance of between 20 and 25 miles to the Gold Run mines across Dominion creek.

The season's returns from Duncan creek are reported to be about $20,000. The season, owing to high water, was very short, lasting only from July 1 to September 13.

**Toronto.** Oct. 20.

W. E. H. Carter, provincial inspector of mines, reports that the following gold mines in the Manitou region are being operated: Little Master, Big Master, Laurentian, Volcanic Reef, Gold Standard and Giant. A stamp mill has been erected at the King Edward. At Eagle lake, the Baden-Powell, Eldorado, Grace and Pioneer Island mines are in operation. A 5-stamp mill has been erected at the Baden-Powell, which will be working by about the end of the month. In the Dryden region, the Ideal and Redeemer mines are being worked, a 10-stamp mill, which will begin operations in about a week, having been put up at the latter.

Thomas Southworth, director of colonization and forestry for Ontario, states that during a recent trip of inspection through the western part of the Temagami forest reserve, a little-known section of the country, he learned of the discovery at Fort Matachewan, on the Montreal river, of an extensive nickel-copper deposit. It is at least 60 ft. in depth, as one side of it is on the river bank, which is of that height, and it probably continues below the river. It extends a considerable distance back. The deposit has been partially examined by a few prospectors, who report favorably as to its value. Mr. Southworth also heard of discoveries of asbestos and mica deposits on the reserve, though no definite details were obtained.

The mills in connection with the plumbago mines at Graphite City, near Buckingham, Que., are being overhauled and enlarged previous to the resumption of operations on a larger scale than heretofore. They will give employment to about 75 men.

The Stirling Co., Ltd., of New Jersey, has obtained a judgment in Toronto against the Nickel-Copper Co., of Hamilton, Ont., for $68,231. The plaintiffs about two years ago advanced $65,000 to the Nickel-Copper Co. on options, but the latter was unable to fulfil its obligations, and judgment was given for the amount, with interest. The Stirling Co. will not be able to realize for some time, as the Nickel-Copper Co.'s property is mortgaged to Mr. McConnell, of Ottawa, for $200,000, and recently the Hoepfner Refining Co., of Hamilton, the members of which are officials of the Nickel-Copper Co., seized the property of the latter, on a claim for $48,000 rent, and announced a sale, which did not, however, take place.

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**Victoria** Oct. 18.

*The Coast.*—Work is now being steadily prosecuted on the Indian Chief claim, at Sidney Inlet, a shipment of 100 tons of rich copper ore having been made to the Ladysmith smelter this week. The Britannia Copper Syndicate, Ltd., is installing at Howe sound an aerial tramway and other equipment. The company is also developing a water power affording 500 h.p. under an effective head of 1,000 ft. The plant includes Pelton type wheels, Westinghouse three-phase alternating circuit generators (two being 200 kw., 6,600 volt, the high voltage obviating the installation of raising transformers), and 10 induction motors, the largest of which is 150 h.p., for installation at the mine.

*Atlin.*—On Birch creek during the past season 30,000 cu. yd. were removed, all the gravel containing reasonably good values. The company for the first time realized a profit over operating expenses.

*Cariboo.*—Arrangements are being made for the sale of the property and assets, subject to the liabilities other than liabilities to shareholders on their shares, of the Cariboo Consolidated Co., and the property and assets of the Gold Lands Corporation, Ltd., to a new company to be formed, with a nominal capital of £200,000, and to be called the Cariboo Consolidated, Ltd. Meanwhile Mr. J. D. Kendall, formerly resident partner in British Columbia of Bewick, Moreing & Co., has been engaged to inspect and report on the Slough Creek mines.

*Lardeau.*—The capacity of the Oyster-Criterion mill, at Camborne, is to be shortly increased by the installation of an additional 10 stamps. Necessary mine buildings are also being erected. The Mammoth, on Goat mountain, owned by a Nelson syndicate, has begun shipment of some rich ore, said to average from all values $200 to the ton.

*Slocan.*—A cable message from Edinburgh states that £10,000 has been subscribed in that city towards the erection of a smelter at Slocan City, a company with a capital of $100,000 being about to be formed with this object in view. The amalgamation of the Whitewater Mines, Ltd., with the Whitewater Deep is under contemplation.

*Nelson.*—At a recent meeting of the Mollie Gibson company, preliminary to reorganization, it was reported that by the issue of a call of 3.5 cents per share to shareholders, all the debts of the company had been paid. Another meeting will be held in November to complete the proposed reorganization and incorporation of a new company, with a capital of $2,000,000. Meanwhile work at the mine is being continued, the tramway extended and the new mine buildings erected. The superintendent reports that there is sufficient ore in sight to warrant the early erection of a concentrator. An important strike is reported to have been made at the Ymir mine, five feet of high-grade ore, in addition to a large body of milling grade, having been recently opened up in the No. 1 level. Work is to be resumed at the Foghorn this week. The mine and plant of the Active Gold Mining Co., on Porcupine creek, has been seized to satisfy a judgment.

*Rossland.*—The first carload of electrolytically refined lead sent from the Trail smelter to the Carter white lead factory at Chicago is said to have proved very satisfactory, the product being noticeably whiter than that produced generally from refined corroding lead, while the amount of tailing was also less than is usual. The Caribou, adjoining the Jumbo at Rossland, has been acquired under working bond terms extending over a period of two years by Mr. M. R. Galusha, one of the owners of the Jumbo mine, and Messrs. Eden & Morgan, of the Great Northern Railway Co. The property is crown granted and has been developed by open cuts and tunnels. The new Elmore plant at the White Bear mine has been completed and will be in operation shortly.

*Boundary.*—During the past week or so work has been started on a number of high grade properties in the vicinity of Greenwood, including the Last Chance, Skylark, Bonnie Belle, Combination, Strathcona and Tip-Top. On the Strathcona a promising pay-shoot running from $50 to $100 was encountered while drifting south on the vein. Ore is now being sent down steadily from the Montreal & Boston company's mines to the Boundary Falls smelter.

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**Monterey.** Oct. 19.

The heavy rains have ceased for this season, the works and roads damaged are being repaired, and new and active mining operations have begun. In Durango, the Gavilanes mines, 100 miles west of Durango, and about one day's horseback ride from the famous San Dimas mines, are being opened up by the Gavilanes Mining & Milling Co., organized in Chicago by E. M. Bird, of Torreon, for the purpose of purchasing and developing the mines. They are said to have paid $60,000,000 to Charles V of Spain, which was only 20 per cent of the product. It is reported that $100,000 gold was paid by the new company for the option alone. The purchase price has not been made public. The purchase also includes a 30,000 acre tract of timber land. Preparations are being made for the construction of a 500-ton stamp mill for the property. The American Mining Co. has been organized, with Geo. Snyder as president, and a $25,000 gold capital to work the Fauro, which comprises about 50 pertinencias adjoining the Peñoles company's properties in Mapimi. At Conejo, about four hours' horseback ride from Guatamapé station, on the Tepehuanes branch of the Mexican International railroad, the Hurtedeña, La Palma, El Chaiz, and the San José mining companies, and St. George's Syndicate, with shafts varying in depth from 250 to 500 ft., and four 10-stamp mills, have formed a consolidation, and work will be concentrated on the 500-ft. shaft of the Hurtedeña. A larger and central mill will be erected as the development work demands.

At the Aguascalientes plant of the American Smelting and Refining Co. something like 40,000 tons of ore per month are being smelted. Of this, 5,000 tons are being treated by three lead furnaces, and the remainder, being copper ores, in the copper blast furnaces, whence the matte goes to the converters, from which is obtained 98 per cent pure copper, high in gold and silver. This is shipped by way of Tampico on the company's own steamers to Perth Amboy, N. J., for separation.

In Sonora, the Bufa Mining & Smelting Co., about 160 miles west from Miñaca, the terminus in Chihuahua of the Kansas City, Mexico & Orient railroad, is expending $350,000 gold in improvements and machinery, including a 50-ton concentrating plant and reverberatory smelters, under the presidency and general management of David Richardson. The new stack of the Cananea Consolidated Copper Co., at Cananea, which is 56 by 180 in., and one of the largest copper blast furnaces in existence, with an expected daily capacity of 500 tons, is fast nearing completion. A 100-stamp mill has been ordered for the Cerro Prieto mine of the Nogales Copper Company.

**London.** Oct. 15.

As I anticipated when writing last week, the shareholders of the British South Africa Co. refused, at their meeting, to ratify the directors' proposal in connection with the underwriting of the new issue of shares. The proposition was to issue £1,000,000 in new shares at 21s. each, and to place half the issue in the hands of underwriters at 20s. each, though at the time the arrangements were first made the market quotation of the shares was about 30s., thus giving the fortunate underwriters a big present. The proceedings at the meeting of shareholders were boisterous, and there was a strong opposition to the underwriters' proposals. Most of the fighting was over a proposition put forward by some shareholders that only 500,000 shares should be offered for subscription at the present time. This the directors would not accept, and the chairman declared the sense of the meeting to be in favor of the original proposition of the directors to issue 1,000,000 shares at once, though there is some reason to doubt the correctness of his judgment in so doing. When, however, the amendment nullifying the underwriting proposition was put forward, the chairman and other directors did not fight very hard. In fact, they retired from the meeting amid the din of voices, and at first the shareholders did not recognize the fact that the directors had abandoned their position without fighting it out. The new arrangement for the issue, as announced by the directors the day after the meeting, is that shareholders shall apply for a pro rata allotment at 21s. and afterwards be allowed to apply for such shares as are not taken up.

The whole incident of this issue is a reflex of the condition of the stock market. The stockbrokers and financial houses who are responsible for the maintenance of the price of chartered simply forced the directors into giving them these extraordinarily favorable terms, for in these dull days the financial houses want strong inducements. On the other hand, the directors were no doubt afraid that shareholders would not respond to the whole million and decided to bow their necks to the heavy yoke of the financial houses. The result of the shareholders' agitation in nullifying the underwriting agreement is, no doubt, not unacceptable to those directors who have no personal interest in the issue of the shares. How the underwriters will fare is not quite clear. It is said that large blocks have been sold by them at current market quotations, and that they were practically in the position of covered bears. As the action of the shareholders has the effect of putting them in the position of uncovered bears, there is some prospect of difficulties in the market. Unless they can wriggle out of their commitments, it looks as if they would have to continue to depress the market by some manipulation or other. Otherwise, if there are any other financial houses strong enough, or willing, to conduct a bull campaign, the quotation will be maintained, or even advanced, by the forced buying back on the part of the underwriters. The difficulty in the way of such an advance is that many shareholders who are now buying at 21s. will try to realize their profit immediately, and if so keep the market price low.

After having been out of the list of dividend payers since 1901, the Lake View Consols has once more earned a distributable profit. The report for the 12 months ended June 30 last announces that the profit was £33,000, out of which it is proposed to pay £26,250 as dividend, being at the rate of 7.5%. This rate is low compared with 100%, 150%, 225% and 50% paid during the years 1897-1901; but the earning of it reflects greater credit on the managers. It is of no value to rake up the old history of the mine, and it is more to the point to mention that Bewick, Moreing & Co. have emerged successfully from a most difficult task. During these three years of suspension of dividends the mine produced gold to the value of over £800,000, which sum has been spent on exploratory work, reorganization of the plant and mine, and the writing off of former accounts for the same object, as well as paying all current expenses. The company now stands in a very favorable financial position, and the mine is in thorough working order. It is interesting to note that the working costs have been reduced by half, and stand at £1 5s. 6d. per ton at present. During the last year the ore treated was of comparatively low grade for West Australia. The amount treated was 101,960 tons (of 2,000 lb.), and the yield was 50,759 oz. gold and 12,781 oz. of silver (both fine), realizing £216,888. During the same time the working costs were £144,331, and the total expenditure in West Australia £180,448. The reserves of ore on June 30 last included 45,890 tons proved on three sides, averaging 10.7 dwt. per ton, and 74,255 tons proved on two sides, averaging 9.3 dwt. per ton. None of the assay values were over 16 dwt. In addition to these reserved there are large bodies of pay-ore below the 1,200-ft. level, but their extent has not been determined. The general position, therefore, is that the mills have a year's supply before them, with every prospect of the supply continuing.

**Sydney.** Sept. 25.

*New South Wales.*—During the four weeks ending September 7 the Broken Hill Proprietary Co. raised about 51,000 tons of sulphide ore. The salt-cake plant is treating about 2,000 tons of zinc tailing per week with satisfactory results, while the quantity of sintered amounts to some 1,400 tons. The output from the refinery during the four weeks was: Silver, 426,086 oz. fine; lead, 4,988 tons; antimonial lead, 36 tons. At Block 10 mine the lode has been opened up at 1,215 ft., and proved to be 30 ft. wide and above the average grade. It is expected that the new mill at this mine will be running next month. This plant embodies all the improvements which experience of the requirements of this field has suggested, and should prove of great benefit to the company. The mill at the South mine is giving general satisfaction, the recoveries for the current half year being 73 per cent of the lead, 54 per cent of the silver, and 10 per cent of the zinc contents of the ore.

The crop of labor troubles in this State grows apace. In a recent letter reference was made to the decision of the colliery proprietors in the Northern district to reduce the selling price of coal, which carried with it a decrease in the hewing rate. As then anticipated, the miners have promptly objected to any reduction of the hewing rate and have succeeded in obtaining an interim injunction from the arbitration court restraining the owners from giving effect to their intentions until the miners have had their protest decided. It is interesting to note that, irrespective of what the court may ultimately decree, the employees at three of the principal collieries have already decided not to work at the reduced rates, and here we get a good insight into the principles of compulsory arbitration as viewed from the standpoint of labor.

The first coal cutters in the southern district are being installed at the Coledale colliery by the General Electric Co. As the mine is gaseous, insulated cables are being laid in accordance with the recommendation of the English Commission.

F. S. MANCE.

## PERSONAL.

**Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.**

Mr. W. B. Devereux is in Arizona.

Mr. Thos. H. Leggett is in New York.

Mr. Philip Argall is at Bodie, California.

Mr. John Seward, of New York, has gone to Nova Scotia.

Mr. Seeley W. Mudd, of Los Angeles, is on a visit to New York.

Mr. George E. Kedzie, of Durango, Mex., is visiting New York.

Mr. Walter P. Jenney is examining the Minnie Moore mine in Idaho.

Mr. Edwin C. Holden has returned to New York from Chihuahua, Mexico.

Mr. C. W. Purington has returned from Alaska and is now at Washington.

Mr. C. W. Kempton has returned from a professional trip to Santo Domingo.

Mr. William Braden leaves for Santiago, Chile, about the middle of November.

Mr. M. C. Dalton is examining mining properties along the San Pedro river in Utah.

Mr. E. M. Rogers is inspecting the properties of the Bamberger-De Lamar company, in Utah.

Mr. Wm. George, of Bloomington, Ill., is investigating his properties in Oaxaca, Mexico.

Mr. J. H. Collard has returned to Denver from making examinations in Oaxaca, Mexico.

Mr. John Converse, of the Baldwin Locomotive Works, has been on a trip to Mexico City.

Mr. C. Baring Horwood is assistant engineer with Dr. Frederick Hatch, at Johannesburg.

Mr. J. H. Batcheller is engaged in professional work at Bourne, Baker county, Oregon.

Mr. Andrew Carnegie, president of the Iron & Steel Institute, arrived on the *Celtic* October 23.

Mr. Jesse Scobey was in Denver last week, after a professional trip in Jalisco and Sonora, Mexico.

Mr. W. de L. Benedict has returned to New York after three months spent in California and Nevada.

Mr. G. R. Hancock, of Salt Lake, has been appointed superintendent of the Curtis mines, at Park City, Utah.

Messrs. S. R. Porter and Geo. W. Parsons, of Los Angeles, Cal., are examining properties in Guerrero, Mexico.

Mr. E. W. Walter is general manager of the Takilma, Wash., smelter, to succeed Mr. A. I. Goodell, who has resigned.

Mr. George E. Gunn has returned to Salt Lake from inspecting properties for the American Smelting & Refining Co.

Mr. W. L. Austin has returned to New York from Idaho. He is not connected with the White Knob Copper Company.

Mr. Thomas Cornish, former manager of the Stratton's Independence, Ltd., is now operating a lease on the Independence.

Sir James Kitson, member of the council and former president of the Iron & Steel Institute, arrived on the *Celtic* October 23.

Mr. Edgar Rickard is in San Francisco; he expects to visit Wardner, Idaho, also Colorado Springs, St. Louis and New York.

Mr. F. A. Shermer, of Boston, is on an inspection trip to the Boston Consolidated, at Bingham, Utah, in which he is a director.

Mr. Allen M. Yonge has been appointed general superintendent of the Tres Amigos mines, in the Abangarez goldfield, Costa Rica.

Mr. O. H. Fairchild, metallurgist with the Greene Reduction Co., will instal a mill for the Briganza Mining Co. near Prescott, Arizona.

Messrs. H. B. S. Randall and F. W. Bailey have opened an office in Monterey, Mex., to do general mining engineering and experting work.

Mr. Herbert Kilburn Scott, of London, has arrived in New York for the purpose of attending the meeting of the Iron & Steel Institute.

Mr. H. E. Clifford has been appointed acting professor of the department of electrical engineering at the Massachusetts Institute of Technology.

Mr. Samuel Dunkerly has resigned as general mine superintendent for G. B. Markle & Co., and has been succeeded by Mr. George Minnichbauch.

Mr. Henry W. Edwards is engaged in remodelling the Silver City Reduction Works, at Silver City, N. M., which were recently destroyed by fire.

Mr. L. S. Searles has accepted the position of superintendent of ore mines for the Chapman Iron, Coal & Coke Co., of New York and Goshen, Virginia.

Messrs. C. Greiner and C. Kraft, of the Cockerill Works, Seraing, Belgium, one of the largest iron and steel concerns in Europe, are now in this country.

Mr. A. C. Lane, state geologist of Michigan, will give a series of lectures on economic geology at the University of Michigan during the second semester.

Mr. I. C. Russell, of the University of Michigan, has been engaged during the past summer in examining the surface geology of the northern part of Lake Michigan.

Dr. Erich Kayser, district geologist at Berlin, Germany, has been appointed full professor and director of the Mineralogical Institute at the University of Giessen.

Mr. Francis T. Freeland, returning from an extended tour around the Mediterranean and over Europe, passed through New York on his way to Philadelphia and St. Louis.

Mr. F. H. H. Calhoun,, a graduate of the University of Chicago, was recently elected professor of geology and mineralogy in Clemson Agricultural College of South Carolina.

Messrs. R. H. Sayre and A. N. Cleaver, of South Bethlehem, and W. A. Lathrop, of Wilkes-Barre, Pa., have been looking after interests in the Birmingham district, Alabama.

Mr. George Z. Edwards, formerly superintendent of the Consolidated Mercur mine, at Mercur, Utah, has accepted a similar position with the Lincoln Mining Co., at Pearl, Idaho.

Mr. Ralph Sprado has resigned as manager of the Lake Shore Engine Works, of Marquette, Mich., to enter the services of Chalmers & Williams, of Chicago, as consulting engineer.

Mr. R. W. Dickman, of Dickman, McKenzie & Potter, has returned to Chicago, after a month at Monterey, Mex., on professional business, as a guest of Mr. H. E. Tuttle of that place.

Mr. A. H. Elftman has returned to Minneapolis from a professional visit to the Vernon mining district, British Columbia. He will be in Utah the first week in November inspecting properties at Park City.

Mr. W. H. Packer, superintendent of the 48-in. mill at the Homestead Steel Works of the Carnegie Steel Co., Pittsburg, has resigned to become general superintendent of the mills of the National Tube Co., at Lorain, Ohio.

Mr. Siegfried Pels, of Hamburg, European agent for Witherbee, Sherman & Co., has been at Duluth and on the Mesabi range this week. On his way West Mr. Pels stopped at Port Henry, where are the Witherbee, Sherman & Co. mines, at the Sault.

Mr. James Walter Goldthwait, of Lynn, Mass., has been appointed instructor in geology at Northwestern University. Mr. Goldthwait is a graduate of Harvard and has done considerable advanced work there, as well as assisting in the work of instruction.

Mr. J. R. Finlay, formerly manager of the Portland Gold Mining Co., is about to open an office as consulting mining engineer at Colorado Springs, Colo. Mr. Finlay, who is a graduate of Harvard, has had experience in the Lake Superior iron country, where he opened the Fayal mine; in Ecuador, where he had charge of the properties of the South American Development Co., and in the Coeur d'Alene, where he was superintendent of the Gem mine, besides his experience in Colorado. Recently he has been with the Guggenheim Exploration Company.

## OBITUARY.

Lorenzo B. da Ponte, a well-known mining engineer of Louisiana, is dead at New Orleans.

J. C. Fuller died at Pine Grove, Pa., October 19, aged 77 years. He was formerly of the banking firm of Jay Cooke & Co. and was president of the South Mountain Mining & Iron Co. and the Hunters Run and State Belt Railroad Co.

Charles Horace Gooderham, a capitalist of Toronto, died October 18, aged 60 years. He was largely interested in British Columbia gold mining enterprises and was a director of the War Eagle Consolidated and Central Star mining companies.

Carl Ernst Betrand, who with E. T. Thiel invented the Betrand-Thiel process for the refining and improvement of bessemer steel, died at Kladno, Bohemia, October 7. Mr. Betrand was the son of Carl Betrand, of Lake Hopatcong, N. J. Upon his father's death he went to Tuebingen, and later to Goettingen, taking up technical courses in metallurgy and chemistry. He entered the Teplitzerwalzwerk as an under-chemist, and through persistent efforts became the head of the works. Later he associated himself with the Kladno Eisenwerk, and at his death was the head director and owned the greater portion of the stock. He leaves a widow and five children.

## SOCIETIES AND TECHNICAL SCHOOLS.

*Michigan School of Mines.*—The following appointments have been made to the teaching force of this institution at Houghton, Mich.: Arthur Alexander Koch, University of Basel, instructor in chemistry; Charles Franklin Bowen, University of Wisconsin, and Eugene Thomas Hancock, University of Wisconsin, instructors in geology and mineralogy; Charles Hamilton Hoyt, Thayer College of Engineering, instructor in civil and mining engineering, and Durward Copeland, Massachusetts Institute of Technology, instructor in metallurgy and ore dressing.

*Society of Naval Architects and Engineers.*—The 12th general meeting of this society will take place in New York City on November 17. The meetings will be held in the auditorium of No. 12 West 31st St., the sessions continuing November 17 and 18. There will be a banquet on November 18, to which the members and their guests are cordially invited. The customary arrangements as to tickets, seats, etc., will be observed.

*Society of Chemical Industry.*—At the initial meeting of the New York Section for the new season, held at the Chemists' Club on October 21, the chair was taken by R. W. Moore. A short address of thanks and appreciation of the success attained at the annual general meeting in New York was made by the newly-elected president, Dr. W. H. Nichols. It was said that Sir William Ramsay and his British friends were more than delighted at the courtesies shown during their stay in this country, and that they were agreeably surprised at the large manufacturing plants in the cities they had visited. The next general meeting will be held in London, the arrangement committee for which has been chosen as follows: R. W. Moore, chairman; T. J. Parker, secretary; R. C. Woodcock, Dr. E. G. Love, Virgil Coblentz and Dr. H. Schweitzer. Mr. J. R. Mardick read an elaborate paper on 'The Present Methods of Tannin Analysis and Their Influence on the Manufacture of Leather,' and H. W. Maurer commented on the uses of thermometers and mercury vacuum gauges which he exhibited. At the close of the meeting a 'lustfest' was given by the Verein Deutscher Chemiker.

*University of Illinois.*—The first of a series of bulletins to be published by the Engineering Experiment Station has recently been issued. It is on 'Tests of Reinforced Concrete Beams,' and is by Mr. Arthur N. Talbot. Copies of the bulletin mentioned may be had by addressing the Board of Direction of the Engineering Experiment Station, Urbana, Illinois.

## TRADE CATALOGUES.

A circular, descriptive of its pump governor and quick-closing water gauges, is sent out by the Williams Gauge Co., of Pittsburg, Pa.

Facts about 'Globe' brand graphite are included in a little book prepared by Geo. C. Blackwell Sons & Co., of Liverpool, England.

The Rand Drill Co., of New York, devotes circular No. 14 to a description of the "Imperial" pneumatic hammer and the "Imperial" piston air drills.

Catalogue 046, issued by the C. W. Hunt Co., of West New Brighton, N. Y., describes electric hoists, winches and capstans, for direct or alternating currents.

A handsome and carefully prepared book is catalogue No. 16, issued by the Bristol Co., of Waterbury, Conn., describing Bristol's recording volt, ampere and Watt meters.

The National Equipment Co., of St. Louis, Mo., has issued a little book—steam bulletin No. 11—which describes its branch steam trap, and gives testimonials from those who have used it.

'Something Pneumatic' for September, issued by the Chicago Pneumatic Tool Co., of Chicago, Ill., contains much interesting information prepared in attractive way about the well-known products of this company.

The Auburn Ball Bearing Co., of Rochester, N. Y., in its bulletin No. 1, describes the Auburn ball bearings; in bulletin No. 6 the Auburn ball thrust bearings and the Auburn ball washers, while bulletin No. 5 contains testimonials from users of the bearings made by the company.

The Current Motor & Irrigation Co., of Spokane, Wash., has prepared a booklet describing a current motor which it manufactures. The motor was conceived with reference to its application for pumping water for irrigation, but it is not limited to this use. It is a device which can generate power, and is therefore applicable to pumping water for railroads or for sluicing purposes in connection with mining and for other operations.

## INDUSTRIAL.

The Roessler & Hasslacher Chemical Co., of New York, has been awarded a grand prize at the St. Louis Exposition.

The Allegheny Steel & Iron Co., of Pittsburg, will add another sheet mill to its plant at Avenue, Pa., which now contains six hot mills, all of which are in operation. The Interstate Steel Co., an identified interest of the company, will also add another sheet mill to its plant at Avenue.

The La Belle Iron Works, Steubenville, O., blew in its furnace No. 2 on October 24. It has been under construction for more than a year, and will produce all the iron required by its steel plant. The new furnace is 90 by 20 ft., and is equipped with four Massicks & Crooke stoves, each 85 by 21 ft. Its annual capacity is estimated at about 150,000 tons. Stack No. 1 of this plant was blown in more than a year ago, and with the two furnaces in operation the annual output will be 300,000 tons.

The Rock Island Arsenal, at Rock Island, Ill., has recently purchased a large oil filter from the Burt Manufacturing Co., of Akron, Ohio. This firm not only supplies the United States Government with its products, but does an extensive business abroad. Besides shipping two of its 8-in. exhaust heads, for the use of the Government at Seattle, Wash., it has recently made a shipment of 16 exhaust heads and 9 oil filters to supply its English trade. The company also reports the sale of three oil filters to its agency at Calcutta, India.

Among the recent installations of the fan heating system in roundhouses by the B. F. Sturtevant Co., of Hyde Park, Mass., are those at the Wabash Railway Co.'s roundhouses at St. Louis, Mo., and Montpelier, Ohio; the Pennsylvania Railway Co.'s roundhouse at Philadelphia, Pa.; the Illinois Central Railway Co., Chicago, Ill.; the Chicago, Milwaukee & St. Paul Railway Co., Galewood, Ill., and nine roundhouses of the Canadian Pacific Railway Co., at North Bend, B. C.; Regina, Assa.;

Sault Ste. Marie, Ont.; Cartier, Ont.; Webbwood, Ont.; Chalk River, Ont.; McAdams Junction, N. B.; Outremont, P. Q., and Toronto Junction, Ont.

The Wellman-Seaver-Morgan Co., of Cleveland, Ohio, has been awarded by the board of trustees of the sanitary district of Chicago the contract for the turbine water wheel equipment for the new power-house of the Chicago drainage canal. The company had as competitors the most noted European and American builders of water wheels. This is the second largest installation of water power equipment contracted for in the United States, the largest single water-power equipment previously contracted for being the one also built by the Wellman-Seaver-Morgan Co., at Sault Ste. Marie, Mich., for the power-house of the Lake Superior Power Co., and to consist when completed of 50,000 h.p. The Chicago drainage canal power station, which is to be located near Joliet, will be the most complete and up-to-date plant in the United States, and a model of its kind in every detail. The equipment will comprise four 6,000 h.p. units of turbine wheels, which will be direct connected to electric generators. There are also two exciter units of 600 h.p. each included in the contract, which will require about one year for completion.

The Allis-Chalmers Co. won the highest honors at the St. Louis Exhibition with each of its three exhibits—steam engine, electrical and mining. The engine known as the "Big Reliable," and the huge generator built by this company's electrical department, otherwise known as the Bullock Electric Manufacturing Co., each won a grand prize. These two machines, forming the huge unit which supplies the decorative lighting of the exposition buildings and grounds, and which have never failed under the most frequent and most unexpected emergency loads, are well known. In the Department of Mines and Metallurgy, the Allis-Chalmers exhibit was also awarded a grand prize, the highest honor given by the international jurors. Among other features of this mining exhibit are the famous style K Gates gyratory rock and ore breakers, the Overstrom concentrating table, the Allis-Chalmers style A and B crushing rolls, the Gates ball and tube mills, and the heavy 6-ft. Huntington mill, known as the "Anaconda" type, manufactured only by this company. The Bullock Electric Manufacturing Co.'s grand prize covered all its alternators, synchronous motors, direct-current generators and motors, and rotary converters. In addition to this, the Bullock system of multiple-voltage control of motors won a gold medal.

## GENERAL MINING NEWS.

### ALABAMA.

ETOWAH COUNTY.

*Underwood Coal Co.*—The properties of this company, at Altoona, have been acquired by the Alabama Steel & Wire Co. This provides the latter with a connecting link between its steel mills and furnaces at Gadsden and its rod and nail mills near Binghamton. The new property will furnish fuel for all the plants.

### ARIZONA.

GILA COUNTY.

*Coronado Copper Co.*—Work has been resumed on the property of this company, at Clifton.

*New England Consolidated Copper Co.*—This company, at Clifton, is reported to be doing considerable development work on its property.

*Shannon Copper Co.*—This company's plant, at Clifton, is reported to be treating about 600 tons of concentrate daily.

MOHAVE COUNTY.

*Banner.*—Ore is being hauled from this mine, at Kingman, and it is expected that the smelter at Needles will be blown in as soon as a sufficient quantity is received.

*Tom Reed.*—A 20-h.p. hoist is being installed at this mine, near Kingman. Walter A. Fellows is superintendent.

*Victor and Vivian.*—These claims, near Vivian, have been bonded by Col. Thomas Ewing. A hoisting plant will be installed at once.

PINAL COUNTY.

*Arizona Pacific Copper Co.*—This company is reported to be making promising developments on its property, at Kelvin.

*Saddle Mountain Mining Co.*—The old copper smelter on the San Carlos group of this company, at Florence, is being put in order for immediate operation. N. H. Mellor is superintendent.

YAVAPAI COUNTY.

*Val Verde.*—It is reported that a smelter to replace this company's plant, recently destroyed, will be built at Prescott.

### CALIFORNIA.

AMADOR COUNTY.

*Bay State.*—A new orebody has been encountered in this mine. The mill is kept going by the ore extracted in development.

*Central Eureka.*—A dividend of $40,000, or 10 cents per share, has been declared by the company operating this successful Sutter creek property.

*Defender.*—The lower levels of this mine, in the Pioneer district, are being unwatered for inspection by possible buyers. The mill is crushing ore from the dump.

*Grand Prize.*—This mine, in the Pioneer district, is now idle, but it is announced that George S. Andrews, the owner, will resume development after installing a new hoist and a 5-stamp mill.

*Kennedy.*—The addition to the mill at this mine, at Jackson, will soon be ready for operation, giving the mill 100 stamps. The east shaft is to be deepened 200 ft., and other improvements are in progress.

*Little Amador.*—This mine, at Amador City, has been bonded by Julius Fried, of San Francisco, and R. M. Walsh, assistant superintendent of the Keystone. The property embraces the section of the mother lode between the Keystone and the Bunker Hill, and has been considerably prospected at different times since early days, but has never become a producer. The old openings include four shafts, ranging from 500 to 800 ft. in depth.

*North Amador Gold Dredging Co.*—This company has bonded an area of placer ground on the Cosumnes river, near Forest Home.

*Shenandoah.*—The hoisting machinery at this recently abandoned mine, near Plymouth, has been bought by W. F. Detert, who will remove it to a copper mine on the Cosumnes river, which he will reopen.

CALAVERAS COUNTY.

*Ford.*—The mill at this mine is being transferred to a mine near Hodson, in the foothill belt, by R. B. Parks and W. R. Womble.

EL DORADO COUNTY.

*Cash Rock.*—The dam and flume at this hydraulic mine, on the American river, near Josephine, have been washed out, and their restoration for the coming season is doubtful.

*Barbara.*—A new hoist is being placed at this mine, near Gold Hill. W. S. Bacon has been made superintendent.

*Ida Mitchell.*—The electric plant at this mine, in Placerville, has been completed and the power drills started.

*Kelsey.*—Recent developments in the channel in this drift mine, at Kelsey, are to be followed by a larger plant and increased scale of operation. A 3-stamp mill has arrived, and new pipe lines are to be constructed.

*Landecker.*—The new mill at this drift mine, near Placerville, is about ready for operation, with a capacity of 150 tons of gravel per day. The three channels through this large property are being rapidly developed through as many tunnels, and high-grade gravel is being mined.

*River Hill.*—High-grade ore is being taken from the 1,000-ft. level of this mine. Thomas Clark is manager.

INYO COUNTY.

*Toll Road.*—The Bishop & Goldfield Toll Road Co. has been organized to build a toll road from Bishop to the new Nevada camp, lessening the distance from 110 to 82 miles.

LASSEN COUNTY.

*Golden Eagle.*—Sixty men are employed at this mine, at Hayden Hill, and production and development are active. During the current year over 4,000 ft. of new workings have been opened. The entire ore product goes through the large dry crushing and cyaniding plant. Edward H. Benjamin is manager and J. H. Collier superintendent.

MARIPOSA COUNTY.

*Mt. Gaines.*—The new Mt. Gaines Consolidated Mining Co. has consolidated the Mt. Gaines and the adjoining properties of the Hornitos Gold Mining Co. The Hornitos property was recently opened and equipped with a mining and milling plant. W. T. Carter, of Los Angeles, is secretary of the Mt. Gaines company.

NEVADA COUNTY.

*Deep Blue.*—A water reservoir and a dump for washing gravel are being prepared at this mine, at Alleghany.

*South Fork.*—Work has begun at this property, at Alleghany, under the superintendence of F. Cofield.

PLACER COUNTY.

Business men of Auburn have formed a company to manufacture from lava, mixed with a small percentage of cement, a fire-proof material for which various uses are anticipated.

RIVERSIDE COUNTY.

*Temesal.*—The United States Tin Mining Co., which has secured the right to operate the old Temescal tin mine, at Temescal, is now prospecting copper and silver ore in the property. The plant for working the tailings of the tin mine is to be increased. John Armstrong is superintendent.

SAN BERNARDINO COUNTY.

*Dry Lake.*—The Dry Lake Mining & Milling Co., which is developing a property comprising 17 claims, near the Ludlow district, is to enlarge its hoisting, milling and cyaniding plants.

SHASTA COUNTY.

People interested in dredging have bonded the Fitzgerald farm, comprising 2,300 acres, on Clear creek.

*Three Sisters.*—This mine, near French gulch, has been bonded by George Mitchell and S. G. Knott, of Denver, who will at once put a force of men at work.

SIERRA COUNTY.

*White Bear.*—Large nuggets are being taken from the channel in this drift mine, near Monte Cristo, in which 30 men are employed. W. J. Belcher is superintendent.

SISKIYOU COUNTY.

*Salmon River Mining Co.*—This company will this winter cut timber for a three-mile flume to another hydraulic property, at Petersburg, below the mine now operating, and which has been extensively developed. A. S. Graham is superintendent.

*Sawyer's Bar.*—Quite a number of hydraulic mines in this old district are preparing for winter operations, and several quartz properties are undergoing development. The Esmeralda quartz mine, at White's Gulch, will resume milling with the return of a water supply. Edward Hickey is the owner.

### COLORADO.

(*From Our Special Correspondents.*)

BOULDER COUNTY.

*Baron Mining Co.*—New machinery has been ordered for this property, at Salina, and ore bins are being constructed. Considerable ore has been opened up, and shipments will be begun as soon as machinery is in place.

*Caribou.*—Denver parties are operating this property under lease and bond, and it is reported that they will instal an air-compressor plant at the property. C. Carroll, Caribou, Colo., is manager.

*Northwestern Mining Co.*—Two new shaft buildings and two plants of machinery are being put up. The company recently purchased two properties in the Caribou section, which carry average values in gold and silver. Frank Smith, of Caribou, is manager.

*Poor Man.*—This once famous producer of silver ores, at Caribou, is to be reopened again at an early date.

*Ward Rose Gold Mining Co.*—Permission is asked by Allegheny, Pa., parties, in a petition filed in the United States Circuit Court, to foreclose, on account of a bond issue of $50,000, issued in 1900, secured by a mortgage on this company's property.

*Wolftongue Mining Co.*—A new shaft building has been erected and a plant of machinery is being installed on this tungsten property, near Nederland. These ores are milled at Nederland, and the concentrate is shipped to Pittsburg for sale. The ores are reported to carry a good percentage of tungsten values. The property is in charge of William Roach, of Nederland.

*Yankee Doodle Mining Co.*—This company has purchased the Postman claim, on Guinn mountain, near Eldora, and is preparing to carry on active developments this winter.

GILPIN COUNTY.

*Bullion.*—Local parties have leased and bonded this property, in Quartz Valley district.

*Cashier Gold Mining & Reduction Co.*—Arrangements are being made to instal a larger hoisting plant at the Pittsburg mine, deeper and heavier operations being intended. The product is mostly smelting ore and of a good grade. B. L. Campbell, Central City, Colo., is superintendent.

*Gold Dirt Mining Co.*—The Perigo 30-rapid-drop stamp mill, in Gambell gulch, which was erected about six years ago at a cost of $25,000, has been purchased by this company. It will treat the product of the Gold Dirt, and if run to full capacity, will handle 100 tons per day. The company will haul ores to the mill by wagon from the Gold Dirt mine this winter, but intend next spring to remove the mill to a point further down Gambell gulch, where ores can be delivered from the Gold Dirt tunnel, thus minimizing the cost of handling ores to mill. D. C. Earl, Perigo, Col., will be in charge of the mill.

*Gower Mines Syndicate, Ltd.*—This company, in which British capital is interested, owns and operates the Running Lode mine, near Black Hawk. It has acquired by purchase the Big Spring, an adjoining lode. The monthly production is between 500 and 600 tons, divided into three classes, two of smelting, and the third of a high-grade concentrating ore, which is treated at Idaho Springs. The shaft is down 1,050 ft., and there is enough ore in reserve to keep up a steady production for the next two or three years without further developments. T. Dunstone, of Black Hawk, is superintendent.

*Little Raven.*—H. G. Pearce, of Denver, has taken a lease and bond for three years on this group of four claims, in the Russell and Lake districts, from local owners. The shaft on the main workings is down 200 ft., and arrangements are being made to instal machinery and erect top-buildings, with a view to heavier operations.

*National Dredging Co.*—Eastern parties have purchased a large amount of placer ground on Clear creek, east of Golden, and have almost completed the equipment of two gold dredges, at a cost of over $150,000, which they will operate with electricity. The dredges are 110 ft. long and 42 ft. wide, and, with full equipment of machinery, draw about 7 ft. Their combined capacity is 4,000 yd. of gravel every 24 hours.

*Rover.*—Kansas City (Mo.) parties have taken a lease and bond on this property, in Russell district, under management of J. H. Campbell. The main shaft, in 320 ft., will need retimbering, and machinery and topbuildings will be required for further operations.

LAKE COUNTY—LEADVILLE.

*Adelaide Park.*—The new shaft on the Flagstaff being put down by Andrew Dyatt is making good progress, and the same can be said of the new Hub shaft, which is northeast of the Flagstaff. Both of the new shafts are after the ore-shoots which are said to trend through the park. From the old Park shaft a good grade of oxidized iron is being shipped.

*Cloud City.*—The owners of this property have decided to sink the shaft deeper. The present depth is 504 ft., and drill holes sent down from the bottom show that the shaft will have to go about 300 ft. deeper. The new work will be started in a few weeks. The property is in the downtown section, and is west of the Midas. The sinking of the Coronado and Penrose shafts has drained the territory so that the Cloud City will have no trouble from water.

*Coronado.*—Three shifts are driving the drifts on this property as fast as the work can be done, and sufficient ground has been opened to permit of stoping as soon as the owners see fit to commence it. In the south drift the water course that has caused so much trouble at the Penrose will be cut in a few days, when the sinking at the Penrose will be commenced.

*Elk.*—This mine, on Jonny hill, is still following the last streak of ore opened, and the values still held up to 12 oz. gold per ton.

*Ibex.*—The lessees on this property are doing very well, and the shipments of ore this month will reach 5,000 tons. At the bottom of No. 4 shaft lessees are taking out some good copper ore.

*Sunday.*—This mine, at the head of California gulch, is shipping about 40 tons of gold ore a day that will run in the neighborhood of $50 per ton. The ore is clean and shipped to the smelter as it is broken in the mine. The present lease expires December 1, when the owners will take charge and work it.

*Yak Tunnel.*—The electric locomotive is at work and doing satisfactory service. An extra force of men has been put on to open up the ore-shoot of the Tankerstown, which runs to the Bob Ingersoll claim. The ore is a clean copper sulphide, and the shoot is extending with development work.

TELLER COUNTY—CRIPPLE CREEK.

The general conditions with regard to mining in the district were never so good as now. More leasing is being done in the camp than has ever been done before, and a large number of these lessees are making money. The reduction and sampling companies and the transportation companies, and, in fact, all allied with mining and the kindred industries, are very busy. There are now nearly 6,000 recommendation cards from the Mine Owners' Association issued, which, it is safe to say, means that at least 5,000 men are working in the district. There are no members of the miners' union employed.

*Findley Gold Mining Co.*—The Findley mine, owned by this company, is at present one of the big mines of the camp. A large amount of ore is being shipped, and it has a large treasury reserve. It is rumored that as soon as the consolidation with the Shurtloff property is consummated, that dividends will be forthcoming. At a recent meeting of this company and the Valley City Company, which controls the Shurtloff, it was decided to consolidate the two properties.

*Free Coinage Gold Mining Co.*—A new working shaft has been started on this property. It is on the Wilson claim, and will be in a more central place on the property than the old shaft, which was situated on the Rising Sun claim. The property is under lease to Carper and associates, of Denver, and one of the terms of the lease was the sinking of the new shaft to a depth, it is said, of 1,000 ft. The property has produced a large amount of ore in the past. The company is controlled by the estate of the late Sam Strong.

*Homestake.*—The grading for the mill is about completed, and a part of the foundation has already been laid. The new mill, when completed, will be a very large one, and the ore will be treated by the cyanide process.

## INDIANA.

*(From Our Special Correspondent.)*

RANDOLPH COUNTY.

*Regal Oil & Gas Co. of the District of Columbia.*—This company has incorporated in Indiana with $50,000 capital stock. It proposes to purchase, lease or otherwise secure coal mines, coal lands, coal properties and other mineral and mining rights, and to produce, deal in oil and gas and develop oil lands. Thos. N. Condon, of Parker, Ind., is agent, and the headquarters will be in Parker City.

VANDERBURGH COUNTY.

State Geologist Blatchley and State Mine Inspector James Epperson are making an examination of the clay mining industries of this county.

VIGO COUNTY.

President J. C. Kolsom, of the Indiana Coal Mining Operators' Association, says that the operators of the southern Indiana field, as a rule, are surrendering the Indianapolis and gas belt market. The reason given is the refusal of the railroad companies to accept coal offered for shipment. The prices of coal at the mines in Indiana are from 25 to 75 cents lower than a year ago. It is said that for the last six months Indiana operators have been getting a smaller return for their coal than at any time for 15 years. This is due to the lack of an open market caused by railway embargo.

## KANSAS

WYANDOTTE COUNTY.

*United Zinc & Chemical Co.*—The sulphuric acid and ore building of this company at Argentine has been burned, with a loss of $50,000.

## MISSOURI.

JASPER COUNTY.

*Reliance.*—This lease and mill at Duenweg has been consolidated with the Stevison & Moore property, and the 70-acre Smallhouse tract in fee simple, at Neck City, the three properties having been taken over by a new company in the course of organization at a reported price of $300,000.

## MONTANA.

*(From Our Special Correspondent.)*

BROADWATER COUNTY.

*Little Annie.*—This mine, in the Park district, owned by Ed. Humphrey, of Hassel, is under examination by a mining engineer acting for Eastern parties.

*Park District.*—Allen G. Mason, of Helena, has about 45 mines at work. Mr. Mason has secured a long option on several old properties, among them the New Era, Park and Bullion King mines, all of which have been old shippers, but have not operated for some years. Mr. Mason proposes to erect a concentrator at a convenient point, making the plant accessible for the mines mentioned. These mines are 16 miles from the railroad at Townsend. The base ore requires dressing to stand transportation, and until the advent of Mr. Mason the district had been dormant for some years.

JEFFERSON COUNTY.

*Bismarck.*—This old producer, six miles from Boulder, has been leased by Frank Grimes and others, of Butte. The surface ore found on this property in the early days was hauled by bull teams to Corrinne, Utah, a distance of 400 miles; from there it went to Swansea, Wales, for treatment. J. C. Savery, of Cable, is the owner. It has been idle for 20 years.

*Corbin & Jefferson Copper Co.*—The property of this company, near Corbin, controlled by Clarence McCormick, of Salt Lake, is to be prospected by a system of diamond drill holes. The work will be prosecuted under the direction of A. H. S. Bird, of Salt Lake. James Hume, diamond drill operator for the Boston & Montana Copper Co., will have charge of the drilling.

SILVER BOW COUNTY.

*Gagnon.*—This mine has been closed for some weeks, owing to the condition of the shaft, which required re-timbering. The shaft on this property is 1,800 ft. deep, and is sunk on an incline, being the only incline shaft in the dis-

*Jessie.*—A cross-cut driven north from the 1,600-ft. level of the Speculator shaft has tapped a body of copper ore, which by measurement is four sets wide. This is an important find, demonstrating a northerly extent of the copper zone of the district beyond any actual former knowledge. The Jessie was purchased by the Speculator Mining Co. a year ago.

*Speculator.*—A break of the hoisting engine, caused by one side running away, has necessitated the closing down of the property. Ten days' or two weeks' time will be required to repair the damage.

trict of that depth. The Gagnon mine is the chief reliance of the Colorado smelter. Since its close the works have depended on other sources to keep going.

*Badger State.*—Lessees working in this property have made a find of copper-silver ore, which, if it should hold out, will extend the copper ore to new territory, to the north of the proven zone.

## NEVADA.

STOREY COUNTY—COMSTOCK LODE.

*Consolidated California & Virginia.*—At the annual meeting of this company in San Francisco last week the old directors were unanimously re-elected. A resolution was passed authorizing the sale of the company's mining claims on the Brunswick lode to a new corporation named the Brunswick Consolidated Virginia Mining Co. This new company will have 216,000 shares of stock, all of which will be issued in payment for the property thus transferred, and this stock will be distributed among the Consolidated California & Virginia shareholders.

*Exchequer Mining Co.*—At the annual meeting in San Francisco last week the following directors were chosen: Charles Hirshfeld, W. C. Ralston, Chas. E. Elliott, William Henry, George C. Sneider. The board elected Charles Hirshfeld president, W. C. Ralston, vice-president; Chas. C. Olney, secretary.

## PENNSYLVANIA.

ANTHRACITE COAL.

*Black Diamond Coal Co.*—The new colliery of this company, at Branchdale, has started after more than a year of preparation. The company is co-operative, and T. V. Powderly is at its head.

*Enterprise.*—This colliery, at Shamokin, has been on fire since October 15; one man was smothered, and many narrowly escaped death.

*International Mining Co.*—The suit of this company against the Pennsylvania Railroad Co. for alleged discrimination in rebates has been decided for the defendant.

*Lehigh & Wilkes-Barre.*—It is reported that this company, with the Delaware, Lackawanna & Western, will make extensive developments in the district between Wilkes-Barre and Nanticoke, which has hitherto been practically untouched.

*Hillside Coal & Iron Co.*—Suit has been brought against this company by Henry Ziegler for alleged violation of lease on the property.

*West Ridge Coal Co.*—The storage warehouse of this company at Scranton has been burned with a loss of $10,000.

BITUMINOUS COAL.

*Pennsylvania Coal & Coke Co.*—This company's Birdseye mine, at Gallitzin, is again in operation after an idleness of several months.

*Vintondale.*—The mines at this place have closed down indefinitely; 600 men are out of employment.

## SOUTH DAKOTA.

*(From Our Special Correspondent.)*

LAWRENCE COUNTY.

*Burns.*—R. M. Maloney, of Deadwood, has purchased the interest of this estate in the mining claims in Whitewood mining district for $6,500. There are 25 acres in the ground. Mr. Maloney previously owned an interest.

*Eleventh Hour Gold Mining Co.*—Funds have been raised for the building of a 200-ton cyanide plant, for which lumber will be sawed on the ground this winter. The stock is held closely, the heaviest owners being residents of Chicago, Philadelphia and New York. Geo. P. Baldwin, of Philadelphia, is president; Chas. E. Brown, Philadelphia, treasurer, and John Madill, of Spearfish, S. D., secretary and manager. Developments consist of 2,000 ft. of tunnels and drifts, and ore measurements 120,000 tons of carboniferous lime, that is estimated will yield $5 a ton gold. This ore lies on and near the surface, and most of it may be mined by stripping and quarrying.

*Deadwood Standard Gold Mining Co.*—A churn drill is being used for prospecting. The company hopes to discover a supply of high-grade ore to be mixed with its low-grade material for the mill. The mill has not been running this year, but it is expected to be started during the coming winter.

*Hidden Fortune Gold Mining Co.*—The mill is dropping 40 stamps and cleaning up twice a month. An innovation for cyanide practice is amalgamation in cyanide solution at this plant. It is proving entirely practicable.

*Spearfish Gold Mining & Reduction Co.*—The cyanide plant treated an average of 275 tons of ore per day during the first half of October. The ore averages about $4 a ton gold. The cost per ton to the company is $1.65, of which 80 cents is paid for mining and timbering, 10 cents for haulage, and 75 cents for crushing and cyaniding. A new body of ore has recently been disclosed, and the management believes it is a lower contact.

## TEXAS.

*(From Our Special Correspondent.)*

BEXAR COUNTY.

*Linn Oil Co.*—This company, which is drilling a well 12 miles south of San Antonio, is down 1,100 ft. and claims to have struck a paying well.

GALVESTON COUNTY.

*Galveston County Oil Co.*—The test well of this company, two miles northwest of Hitchcock, is down over 500 ft.

HARDIN COUNTY.

*Batson.*—Another fire at Batson did $30,000 damage to oil outfits, the loss being divided among ten operators. The production has fallen off very rapidly, and conservative estimates of daily output do not exceed 11,000 bbl.

*Crawford & Prather.*—This firm has contracted for five wells, one of which is already down over 500 ft. at Saratoga.

*Guffey Oil Co.*—This company, whose No. 1 is still doing 1,500 bbl. daily, has started another well. Six wells are being drilled, and the daily production is about 2,400 bbl. Crude brings 35 cents.

JEFFERSON COUNTY.

*Apex Oil Co.*—The sheriff will sell all the property of this company, at Beaumont, on November 1, to satisfy an execution obtained by the National Supply Co. All the property of the Beaumont Gulf & Madaline Oil Co., including Spindletop, wells, is offered for sale, and the wells and other property of the Greater New York Home Oil Co., capitalized at $2,000,000, has been sold for $200 by the receiver.

*Beaumont.*—The production still declines, and it is doubtful if it exceeds 3,500 bbl. daily. Owners of wells drilled in boom time now wish that better logs had been kept, as many of them are pulling up the pipes to shallower oil sand, and much delay and expense is occasioned by the neglect. Wells will likely be drilled next year to the upper sands, which have been passed by for gushers, but at present no new wells are going down. Crude is still selling at 35 to 36 cents bbl., and both rail and water shipments decreased in September. The estimated output of Texas and Louisiana fields for September was 990,000 bbl., and shipments, 1,400,000; decrease in stocks, 410,000 bbl. The large quantity of stored oil militated against any advance in the price of crude.

*Guffy Petroleum Co.*—This company's well, near Gladys, No. 50, is doing 300 bbl. daily and is the best well in the Beaumont field.

## UTAH.

*(From Our Special Correspondent.)*

The ore and bullion settlements reported through Salt Lake banks during the week ending October 21 aggregated a total of $582,311.

JUAB COUNTY.

*Tintic Shipments.*—During the week ending October 22 shipments aggregated 98 car-loads, as follows: Ajax, 2; Grand Central, 4; Mammoth, 10; Victor Consolidated, 2; Bullion Beck, 10; Gemini, 17; Centennial-Eureka, 33; Uncle Sam Consolidated, 1; Tetro, 1; Godiva, 2; Eagle and Blue Bell, 9; May Day, 2; miscellaneous, 5.

*McKinley.*—A very encouraging change is reported to have occurred in this Tintic property now being developed.

*Utah.*—This company, operating at Fish Springs, has secured a bond on the Galena mine, an adjoining property. The bond runs for a year, and the price named is on a basis of 40 cents a share for the stock.

SALT LAKE COUNTY.

*Bingham Consolidated.*—The shipments of copper bullion from this plant during the week ending October 22 aggregated 244,816 pounds.

*Utah Consolidated Smelter.*—Shipments of copper bullion from this plant during the week ending October 22 aggregated 303,104 pounds.

*United States Smelter.*—The shipments of copper bullion fro mthis plant during the week ending October 22 aggregated 25,880 pounds.

SUMMIT COUNTY.

*Park City Shipments.*—Shipments last week aggregated 3,138,200 lb., the mines contributing being: Daly-West, 2,259,000; Silver King, 1,435,000; Keith-Kearns, 203,000; Creole, 28,000; Ontario, 38,000; American Flag, 27,000.

*Daly.*—Machine drills are being operated in driving the Federal tunnel ahead.

TOOELE COUNTY.

*Ophir Tunnel Co.*—Articles of incorporation have been filed in Utah. The capital is 1,000,000 shares of the par value of $1 each. The officers are A. B. Herrman, president; B. J. Stewart, vice-president; J. A. Butchart, secretary and treasurer, all of Salt Lake.

# FOREIGN MINING NEWS.

## ALASKA.

*Alaska-Treadwell.*—The returns for September were as follows: The 240-stamp mill ran 30¾ days, 300-stamp mill, 30 days; crushed 86,709 tons ore; estimated realizable value of the bullion, $89,561; saved 1,780 tons sulphurets; estimated realizable value of same, $85,728; working expenses, $87,508.

## CANADA.

NOVA SCOTIA.

*Dominion Iron & Steel Co.*—The annual meeting was held at Montreal on October 19. The annual report covering the year 1903 showed net profits of $115,576. Interest on bonds, dividend appropriation for shrinkage, etc., amounted to $1,039,253, which swallowed up the credit balance from 1902 and the profits, leaving a deficit of $584,231. A statement by Graham Fraser as to the present position and prospects of the plant showed that the principal source of supply was the company's mine on Belle Island, Newfoundland, known as Wabana mine, from which the company would take this year about 315,000 tons of ore, of which 115,000 goes to Europe and the balance to the company's works at Sydney. The washing plant is complete and washing coal for two blast furnaces, improving the quality of the coke. Five of the 10 furnaces of the open-hearth plant were in operation, the remaining five being overhauled. The additional gas producers needed to complete the plant are under construction. The mill is in good condition, and of sufficient capacity to roll all the ingots likely to be produced in the open-hearth furnaces. Plans for remodelling and enlarging parts of the present heating furnaces have been prepared and the material was coming forward. President Plummer spoke in a highly encouraging tone as to the future, especially as regards steel rails and rods.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

*Boundary Ore Shipments.*—Shipments for the week ending October 15 were as follows, in tons: Granby, 9,000; Mother Lode, 2,760; Brooklyn, 1,050; Senator, 99; Oro Denoro, 66; Mountain Rose, 165; Althelstan Jack Pot, 180. Total for week, 15,276 tons; total for year to date, 633,414 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

*Rossland Ore Shipments.*—Shipments for the week ending October 15 were as follows, in tons: Le Roi, 2,000; Centre Star, 1,440; War Eagle, 1,140; Jumbo, 140; White Bear, 20; total for week, 4,740; total for year, 275,485.

## MINING STOCKS.

(Full quotations on pages 695 and 696.)

**New York.** Oct. 26.

The upward movement continues, buying by the public increases steadily, and the support given by insiders presages still better things for investors who have suffered so long from low prices. A gratifying feature is the absence of important bear rumors, indicating that speculators in general are trying hard to rehabilitate the market. Certainly the advances made in the coppers suggest that factional rivalry has been dissipated, at least temporarily. Look at the systematic fluctuations in Amalgamated; from $66.875 it has risen to $68.50 under large trading. In certain quarters it is expected that the price will continue to advance, as the metal market is particularly strong, receiving its initiative from heavy exports. Anaconda is quiet, selling at $25.40. Tennessee is strong, touching $33.375, and a little business has been done in Greene Consolidated at $20.625@$20.25. British Columbia is up to $6.00, and United common made a sale at $6.

An interesting development is the unprecedented rise in American Smelters, the common stock selling up to $73.13, and the preferred to $115. It is believed that, aside from the improved earnings of the company, the bullish feeling in the shares has been created by the annexation to the business staff of the United Lead Company of Vice-President Stevens, of the National Lead Co., who had charge of this company's sales department, and of General Superintendent McCarty, of the Atlantic branch of the National Company. Sales of National Lead stock are only moderate, the common being quoted at $22.25@$25, and the preferred at $95@$97.25.

Large transactions are noted in Colorado Fuel & Iron Co. at $40.875@$42 for the common, and $65@$68 for the preferred. United States Steel continues to improve, the common rising to $21.25, and the preferred to $82.50.

Ontario Silver, of Utah, is lower, at $3.75, while Portland Gold, of Cripple Creek, continues firm at $1.70, and Elkton at 64c.

The usual match-order business has been done in the Comstocks. Caledonia having reduced its assessment from 15c. to 10c., sold at 45c., while Ophir brought $2.30@$2.25. Silver Hill is unchanged at 55c.

**Boston.** Oct. 25.

*(From Our Special Correspondent.)*

The market for copper shares has broadened, and the public has come into it in good shape. Reactions on profit-taking have been in order, but new interests have absorbed the sales of tired holders of the past two years. With the possibility of a 14-cent copper market, it seems as if some of the new mines might commence dividend payments in the near future. The buoyancy has now spread to the whole list, and sentiment is still very bullish. Copper Range, which sagged to below $60, rallied on large trading to $65.25, which is less than $10 below its highest price. With the reaction to-day it ran off to $63. Trading in United States has slacked up a bit, although New York people are reported to be accumulating the stock. From $25 it yielded to $23.50, but subsequently rose to $25.25, and closed to-night at $24.50.

Bingham Consolidated has been in steady demand and rose $2.62½ to $33.12½ with hardly any reaction. This company is nearer dividend payments than most people suppose. It has no bills payable, and with cash accumulating, dividend payments will begin early next year. Utah has been firm, but not in so active demand as many others. It touched $43.37½, but yielded to $42.50. Old Dominion spurted to $23.25, losing to $22.50. The second furnace has been started, and results are beyond expectations, so it is reported. Trinity has been active and touched $12.37½. Sentiment is bullish on this stock, on belief that an arrangement will be made to treat the company's ore. George F. Leonard has been elected a director of this company.

Centennial spurted to $30 on a fair demand for the stock, holding all but a fraction. Atlantic picked up, touching $15.50 on prospects in connection with the Isle Royale lode. Michigan spurted to $9.50. Parrot rose to $27.50 on light offerings of the stock. Mohawk rose to $52.25, reacting to $51.25. Osceola touched $91 and Calumet & Hecla sold at $567.50. Quincy came within a fraction of $100, and Wolverine touched $99. Isle Royale has improved $3, to $23.25. Thus far Greene Consolidated, since it has been listed, has not taken very well.

The St. Mary's Mineral Land announced during the week its second dividend of $1, and the Champion one of $1. The latter means $50,000 to each of the Copper Range Consolidated and the St. Mary's Mineral Land companies, as they own equally the 100,000 shares.

**Colorado Springs.** Oct. 21.

*(From Our Special Correspondent.)*

The mining market during the past week has shown a great deal of activity in spite of the fact that politics are taking the attention of the people very largely at this time. Cripple Creek is going steadily ahead, in spite of the labor troubles which have been prevailing in camp. The October dividends will amount to more than $350,000, of which the Portland will pay $180,000 and El Paso $49,000. There is renewed activity on Gold hill, and much work is being done in that vicinity. The Elkton, on Raven hill, is shipping about 100 tons of ore per day. El Paso mine, on Beacon hill, has opened up a body of ore of high value. Stratton's Independence now has 27 sets of lessees at work operating on nine levels. The C. K. & N., on Beacon hill, is making a big production, sending out each month about $30,000 worth of ore. The Black Bell, on the same hill, which is working under a lease, will soon have the shaft down to the 500-ft. point, and is already saving some ore from one of these drifts. There is talk of another large mill and sampler for the Cripple Creek district. The plans have already been drawn, and it is to be erected at the mouth of the Ophelia tunnel.

The higher prices prevailing during the fore part of the week have dropped off somewhat. El Paso sold to-day at $1.17; Elkton at 66; Isabella at 20; Work at 8½ and Black Bell at 4½c. per share.

**Salt Lake City.** Oct. 22.

*(From Our Special Correspondent.)*

The past week was a fair business week on the Salt Lake exchange. Tintic stocks were the most sought, with May Day again in the lead. The latter has risen within the past two months to as high as 36c. a share, the last named price being obtained one day this week. This seemed to be the turning point; at least the price paid on this occasion had the effect of bringing out a great deal of stock purchased at a lower figure, the holders taking their profit and getting out. Star Consolidated became active again and has made some sharp advances, closing with an upward tendency. Uncle Sam Consolidated has not been quite so strong. While no official confirmation can be had, the impression prevails that the November dividend will be passed. Of the Mercur stocks Consolidated Mercur is maintaining its strength. There has been some buying of Victoria, which has been done largely by officials of the Grand Central, who are already heavy shareholders in the Victoria company.

**San Francisco.** Oct. 20.

*(From Our Special Correspondent.)*

The Comstock shares were rather quiet in the first part of the week, and towards its close they showed some signs of depression, followed by a slight reaction. Upon the whole, the tone of the market is quieter than it was a week ago. There has been no special news which ought to affect the market, but the little boom has simply spent its force. Some quotations noted are: Ophir, $2.20; Consolidated California & Virginia, $1.30@$1.25; Mexocan, $1.10; Hale & Norcross, 56c.; Savage, 28c.; Sierra Nevada, 23c. per share.

The Tonopah stocks are now regularly called on the old board. The brokers who came over from the San Francisco & Tonopah exchange, however, do not seem altogether satisfied, and 14 of them have gone back. It is understood that they were not satisfied with the way their specialties were treated.

On the San Francisco & Tonopah exchange business was rather active, although prices were somewhat easier, and in one or two cases there was a considerable drop. Tonopah of Nevada was quoted at $9.75; Montana Tonopah, $1.92; Jumbo, 59c.; Tonopah Belmont, 66c.; Tonopah Midway, 39c.; McNamara, 33c. per share.

On the California Stock & Oil Exchange business was very quiet, and buying orders rather scarce. Kern River was quoted at $10.50; Home, 97c.; Four Oil, 56c.; Occidental, 4c. per share.

The monthly record of sales on the California Exchange from January 1, 1904, is as follows:

| | Shares. | Value |
|---|---|---|
| January | 84,507 | $31,389 |
| February | 96,677 | 45,556 |
| March | 194,630 | 126,559 |
| April | 186,035 | 82,664 |
| May | 202,101 | 100,471 |
| June | 47,498 | 25,303 |
| July | 47,072 | 24,966 |
| August | 90,672 | 43,451 |
| September | 101,330 | 55,810 |
| Totals | 1,050,522 | $536,169 |

The heaviest business was in May, and the lightest in July. September trading was a little below the average for the year.

**Monterey.** Oct. 19.

*(From Our Special Correspondent.)*

Exchange on New York advanced during the week from 216.5 to 217.25, but operations were limited.

With the exception of the stir in Dos Estrellas, which sold as high as $2,680, mining stocks have been quiet. Victoria of El Oro sold at $50; Aldebaran, $80; Reforma, $28; Equidad, $22; Providencia, San Felipe, Guanajuata, $105; Barreno, San Luis Potosi, $85, and La Paz, $210. In Pachuca, Amistad y Concordia sold at $74, and San Rafael at $2,000.

## COAL TRADE REVIEW.

NEW YORK, Oct. 26.

ANTHRACITE.

The plaintiff in the suit against the anthracite railroads has finally rested his case after three hearings before the Interstate Commerce Commission in this city. At the first hearing the plaintiff's attorney presented minutes of meetings of an organization of coal dealers in Chicago, although one of the commissioners pointedly inquired what connection there was between retail prices at Chicago and the alleged combination to maintain prices at tidewater which formed part of the plaintiff's original complaint, and counsel for the railroads objected to the evidence as immaterial. At the second hearing an anthracite operator, noted for his independence, had the witness chair, and, among things, said that he had been injured to the extent of $800,000 by one of the railroads, though admittnig that his reasons for not making the same arrangements as to freight rates that proved profitable to other independent operators were largely sentimental. The three hearings were, in short, evidently held at this time to promote the plaintiff's political aims, and, unless the railroads are eager to put in a defence, the case may rest indefinitely.

The reported purchase of a controlling interest in the New York, Ontario & Western by the New York, New Haven & Hartford railroad has caused considerable comment. Apparently the stock was partly acquired by purchase in the open market, and partly by securing options on certain blocks at private terms. Inasmuch as several interests are represented in the management of the New York, New Haven & Hartford, the deal strengthens the power of the present community of interests that governs the anthracite industry. Possibly the deal is simply to secure tonnage for the Poughkeepsie bridge line, and is a farther move in the direction indicated by the control of the Lehigh & Hudson line by the Pennsylvania some months ago, or possibly the control of the Ontario & Western is secured from deeper motives. The fact that both the bridge and its connecting lines will require the outlay of much capital to put them in shape for handling trains of 50-ton cars was of little moment, in comparison with obtaining a franchise

that may prove of great value—and possibly the same motives are responsible for the reported control of Ontario & Western. Much of the Ontario mileage can hardly be of direct benefit to the New York, New Haven & Hartford, though the deal may be advantageous in several ways, but the road might have formed part of a system, controlled by hostile interests and competing with existing lines. One thing is obvious, that while the control is through a Connecticut, not a Pennsylvania company, the New York, Ontario & Western will now act in harmony with other roads.

The anthracite market is now feeling the approach of winter. In spite of sunny days, nights are cool enough over a wide stretch of consuming territory to prevent people from letting furnace fires go out, and make them have coal on hand to provide for a sudden drop in temperature. The output of the collieries is, however, still restricted, and the actual increase in wholesale buying is small, but the increased buying has a sentimental effect out of proportion to its actual volume, and sales agents and dealers feel confident of better demand from now onward. The smaller steam sizes are feeling the restrictions on output and the greater strength of the market most, and the free-burning grades of these sizes are almost in short supply. The prepared sizes are in less active demand, and of these egg is apparently least wanted.

At the head of the lakes demand from inland points is moving a heavier tonnage from the docks. In Chicago territory city buying is rather quiet, but county yards report better business. Along the lower lakes and in Canadian territory better trade conditions are reported by most dealers. In the line trade demand has improved. Along the Atlantic seaboard conditions vary. There is a slight increase in the movement to points east of New York, and an improvement in retail buying at all points. About New York harbor conditions are decidedly better. The prepared sizes sell at circular figures. Of the steam sizes, free-burning No. 1 buckwheat is selling at $2.40@$2.45, f. o. b. New York harbor shipping port, while the harder grades are selling at $2.20.

BITUMINOUS.

In the seaboard bituminous trade demand is now of better volume than it has been, due to preparations for the winter, and the last orders from the shoal water ports are now coming in. Car supply at the mines is poor on all roads, and this must affect all-rail business to eastern points, as this trade is the first to feel any reduction in car supply. Bunker trade is demoralized, especially at the farther lower ports. The coastwise vessel market is in an uncertain state, with rates very low. The Coastwise Carriers' Association is not seeking to control rates in any way, but is apparently still in existence, and, being managed by men who know when to make demands, will probably be heard from as soon as the proper time arrives.

In the far East trade is now reported good, and orders for shipment to that territory are fairly plentiful, notwithstanding a belief that stocks on hand are large. Along Long Island sound trade is keeping up quite well. At New York harbor quietness prevails, and prices are unchanged on the basis of $2.40@$2.50 for ordinary Clearfield grades, f. o. b. New York harbor shipping port. All-rail business is active, and prices are fairly strong.

Transportation from the mines to tidewater is generally prompt. Car supply is slow and poor, though most roads are making restrictions of various kinds to improve matters. In the coastwise vessel market the situation is unchanged, vessels enough offering charters to keep rates down. We quote current rates on large craft from Philadelphia as follows: Providence, New Bedford and Long Island sound, 50c.; Boston, Salem and Portland, 55@60c.; Porstmouth, 60@65c.; Lynn and Newburyport, 70c. Rates from New York harbor to around Cape Cod are 50@55c. Rates from the lower ports are the same as from Philadelphia.

**Birmingham.** Oct. 24.

*(From Our Special Correspondent.)*

An official estimate has been made of the prospective output of the coal mines in Alabama for the present year (1904), and the figures given are 12,400,000 tons. During the year 1903 the official report of the State mine inspector shows the production aggregated 11,700,753 tons. An increase is looked for this year, notwithstanding the strike of the United Mine Workers of America, in which 8,000 men have been out on strike for nearly four months already, with prospects for two more before the same is concluded, one way or the other. About 6,000 members of the union are at work with commercial coal operators who made temporary contracts with the organization. There has been such a demand, since the strike began, for coal that non-union mines, convict mines and union mines with temporary contracts have been working hard, and their efforts have brought forth a production which has been telling. One non-union mining corporation—the Pratt Coal Company—will show up a production in Jefferson county this year of about one million tons, though operations started but six months ago. Then there have been several other smaller mines developed in the past few months.

The topic in the coal industry of this State during the past week was the sale of the mines and properties of the Underwood Coal Co., located in Blount county, on the Birmingham Mineral railroad, to the Alabama Steel & Wire Co. While nothing definite as to price is given out, it is understood that something like $350,000 passed in the transaction. The Alabama Steel & Wire Co. now owns coal mines and coke ovens at Virginia City, in Jefferson county, and the Underwood mines, the latter having 3,100 acres of coal lands in all. The properties just purchased (E. T. and G. H. Shuler, principal owners) are located about half way between Ensley and Gadsden, so that the coal can be shipped to either plant.

**Chicago.** Oct. 24.

*(From Our Special Correspondent.)*

In general terms, the coal market may be said to be a little stronger than it was last week, as regards both anthracite and bituminous. Country trade is better in anthracite; city trade is about the same, which means dull for the season of the year. With the mild weather that has existed so far, the consumer has not felt immediate need, and probably will overwhelm the retailers when he sets out to buy for cold weather at hand. Both country and city trade in anthracite are ragged, orders swelling or falling from day to day. All-rail business, doubtless, will be much better in the coming winter than usual, owing to the scarcity of retailers' stores and of dock supplies in Chicago.

The bituminous market is still troubled with too much fine coal from western mines, which does not bring the cost of mining and hauling it to market. Western steam coals are firm, and domestic sizes are increasing in popularity. Indiana and Illinois lump bring $2@$2.30, and run-of-mine, $1.50@$1.75. Hocking is somewhat bullish, on account of rumors about an advance in price November 1, and sells close to the circular price of $3. Smokeless has been handicapped by car shortages and receipts are not up to demands; it sells for about $3, as heretofore. Youghiogheny brings $2.80@$3 and is firm.

**Cleveland.** Oct. 25.

*(From Our Special Correspondent.)*

The coal trade in this territory has moved along on an even keel during the past week, with the possible exception of a better tone to the coke trade. It is now difficult to get the coke which is needed to keep furnaces in operation, to say nothing of starting in the others which are soon to resume blast. The difficulty seems to be in the shortage of the box cars in which the coke is moved. Prices, both to the furnaces and to the foundries, have been advanced. Foundry coke has gone up 15c. to 30c. a ton, and the furnaces have been informed that the ovens will not quote prices until the end of the year on material which is to be shipped after the first of the year.

The demand for domestic coal is on the mend. Prices hold steady. There has been a better demand for steam coal, and the market has improved steadily. The prices at present quoted are getting pretty close back to some midwinter quotations. Ohio and Pennsylvania coals are bringing $1.15@$1.20 at the mines.

**Pittsburg.** Oct. 25.

*(From Our Special Correspondent.)*

*Coal.*—The market shows considerable improvement, and prices are a trifle higher. Run-of-mine coal is now quoted at $1.10@$1.15 a ton at the mine. The railroad mines in the Pittsburg district are in full operation, there being a good supply of railroad cars. A general resumption has occurred at the river mines, and there will be a large stock ready for shipment on the next rise in the rivers. The question of management of the mines of the Pittsburg Terminal Railroad & Coal Co., which were purchased by the Wabash railroad, has not yet been settled. The mines are being operated about two days in the week pending a settlement. It is confidently believed that the Pittsburg Coal Co. will obtain control.

*Connellsville Coke.*—Production is being restricted, as many of the furnaces have a good supply, having evidently bought in anticipation of a scarcity, or higher prices. The demand, however, is good, and prices have advanced for furnace coke. A rumor that the United States Steel Corporation is likely to be a heavy buyer may have had some effect on the market. Furnace coke is quoted this week at $1.65@$1.75, and foundry coke remains at $1.90@$2.10. The shipments last week were about equal to the production, which was 206,566 tons, a decrease of fully 16,000 tons compared with the previous week. The shipments for the week aggregated 9,015 cars distributed as follows. To Pittsburg and river points, 3,106 cars; to points west of Pittsburg, 4,429 cars; to points east of Everson, 1,480 cars.

**San Francisco.** Oct. 20.

*(From Our Special Correspondent.)*

Mr. J. W. Harrison's circular, of this date, says: "Since our last, nine vessels have arrived with cargoes of Australian coal; the generous arrivals this month up to date, combined with the quantity of Colonial coal now in yard, will keep our market liberally supplied for the moment. There are at present but 19 vessels on the way, and loading Australian coal, the carrying capacity being less than 50,000 tons; at this time last year there were 33 vessels on the loading list, with an aggregate capacity of 110,000 tons. This evidences that there will be no overplus of Colonial coal here this year for our winter demand; the cargoes which have recently arrived, combined with those listed to arrive during the year, will assuredly find eager purchasers. The freight rates on coal from Newcastle to San Francisco still remain high, and vessels difficult to procure, even at the advanced rates. This can be readily accounted for, as the inducements for tonnage to seek this port are slim; outward rates from here for the carriage of grain and lumber still remain depressed. There are no changes to note in the quotations of local coals in yard, as the wholesale dealers seem disposed to make no change in their schedule of values for the present."

For Pacific Coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $14. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14 and Cumberland $13. For English coal, quotations are ex-ship: Welsh anthracite, $13; Cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

**Foreign Coal Trade.** Oct. 26.

Exports of coal from Great Britain to the United States, for the nine months ending September 30, were as follows, in long tons:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| To Atlantic Coast | 1,047,109 | 26,074 D. | 1,021,035 |
| To Pacific Coast | 63,487 | 74,272 I. | 10,785 |
| Totals | 1,110,596 | 100,346 D. | 1,010,250 |

The exports in 1903 were abnormal, owing to the anthracite strike, and were chiefly in the early part of the year.

The total exports of fuel from Great Britain, for the nine months anding September 30, were as follows, in long tons:

| | 1903. | 1904. | Changes |
|---|---|---|---|
| Coal | 33,565,760 | 34,566,665 I. | 1,000,905 |
| Coke | 485,531 | 525,731 I. | 40,200 |
| Briquettes | 716,819 | 957,744 I. | 240,925 |
| Totals | 34,768,110 | 36,050,140 I. | 1,282,030 |

In addition to these exports, the coal sent abroad for the use of steamships engaged in foreign trade was 12,377,704 tons in 1903, and 12,837,332 tons in 1904; an increase of 459,628 tons this year.

## IRON TRADE REVIEW.

New York, Oct. 26.

Accounts from all quarters show a continued revival of activity. This is best manifested in the pig iron market, in which large purchases are reported. Furnaces are covered for the rest of the year, as a rule, and have considerable business for the first quarter of 1905. Beyond that they are not disposed to go without exacting higher prices, which consumers are not yet prepared to pay. The strongest definite advance is in southern pig, where they will not make sales for future delivery, except at an advance of from 75c. to $1 on recent prices.

In finished material there is also greater activity. In plates, bars and structural material this is especially shown.

Reports have been circulated that the United States Steel Corporation was negotiating for large purchases of pig iron from outside interests, with the object of holding up the market and controlling prices of raw material. It has also been reported that the corporation was endeavoring to control the supply of coke by purchases from outside makers. These reports are not fully confirmed, although it is evident that there is something under consideration which may prove important to the market.

It seems quite possible that, with the improved condition of business, some of the outside furnaces may run short of ore before the winter is over. The companies owning mines and the large steel companies are generally well supplied, but shipments down the lakes have been light, and some furnaces have not bought enough to last them, if business continues on the present basis. It does not seem likely that they will be obliged to shut down on this account, but they may have to buy ore at higher prices than those which have prevailed during the season.

*United States Steel Corporation.*—The quarterly statement of earnings, which was made public to-day, shows that the net earnings for the three months were as follows, after deducting all expenditures for ordinary repairs, renewals and maintenance of plants, and the fixed charges of subsidiary companies:

| | |
|---|---|
| July | $6,344,771 |
| August | 6,202,957 |
| September | 6,226,204 |
| Net earnings for the quarter | $18,773,932 |
| Sinking funds, subsidiary companies | $417,883 |
| Depreciation and reserve funds | 3,800,317 |
| Interest and sinking funds | 6,937,825 |
| Total charges | $11,156,025 |
| Net balance | $7,617,907 |
| Dividend on preferred stock | 6,304,919 |
| Surplus for the quarter | $1,312,988 |

The earnings for the quarter compare with $22,422,954 for the corresponding quarter in 1903, showing a decrease of $13,689,022 this year. The total earnings for the nine months ending September 30 have been: 1902, $101,323,004; 1903, $94,133,970; 1904, $51,709,889. The surplus for the quarter shows a decrease of $10,998,707, as compared with last year. The unfilled orders on hand September 30 amounted to 3,027,436 tons of material, a decrease of about 100,000 tons as compared with the statement of July 1. The regular quarterly dividend was declared on the preferred stock.

*British Iron Trade.*—Exports of iron and steel, including machinery, from Great Britain for the nine months ending September 30 are valued by the Board of Trade returns as follows:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Iron and steel | £23,042,561 | £20,747,530 | D. £2,295,031 |
| Machinery | 14,492,871 | 15,512,847 | I. 1,019,976 |
| New ships | 3,347,562 | 3,334,609 | D. 12,953 |
| Totals | £40,882,994 | £39,594,986 | D. £1,288,008 |

Exports of mining machinery were valued at £555,621 in 1903, and £658,618 in 1904, an increase of £102,997. The gain was chiefly in shipments to South Africa, which amounted to £286,611 this year. The chief items of the iron and steel exports were as follows, in long tons:

| | 1903. | 1904 | Changes. |
|---|---|---|---|
| Pig iron | 848,851 | 616,540 | D. 232,311 |
| Steel ingots, etc. | 112,104 | 88,090 | D. 24,014 |
| Bars, etc | 156,923 | 128,673 | D. 28,250 |
| Rails | 488,101 | 411,606 | D. 76,495 |
| Sheets | 122,766 | 109,951 | D. 12,815 |
| Tin-plates | 215,616 | 257,995 | I. 42,379 |

All of these items show decreases except tin-plates.

Imports of iron and steel for the nine months were valued at £6,249,766 in 1903, and £6,205,038 in 1904, a decrease of £44,028. Items of these imports were as follows, in long tons:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Pig iron | 93,838 | 102,717 | I. 8,878 |
| Wrought iron | 133,229 | 77,611 | D. 55,619 |
| Steel ingots, blooms, etc | 149,693 | 414,616 | I. 264,923 |
| All other kinds | 542,265 | 390,957 | D. 151,308 |

The increase in steel billets and blooms, which includes sheet bars, tin-plate bars and other half-finished material, was large and a notable feature of the trade.

Imports of iron ore were 4,961,518 tons in 1903, and 4,619,976 tons in 1904, a decrease of 341,542 tons. Of this ore, 3,880,988 tons were from Spain in 1903, and 3,482,348 tons in 1904, the decrease in Spanish ore being 398,640 tons.

### Birmingham. Oct. 24.

(*From Our Special Correspondent.*)

Strong and steady is the Alabama pig iron mart, with few sales being made right now outside of the Birmingham territory. Furnace companies in the Birmingham district, or rather in the State, are either sold far ahead at prices which can be gotten outside of the home territory, or are holding their product until the quotations are better, prospects of which are very bright. Some iron has been sold here at $11 per ton for No. 2 foundry, but it is stated that it was for local consumption. The statement is made that the Sloss-Sheffield Steel & Iron Co. is holding its iron for $12 per ton, No. 2 foundry, except to regular customers, and already there is more than 50,000 tons accumulated. Other companies are said to be out of the market entirely for delivery during the balance of this year, and are not anxious to sell yet for delivery during the first quarter of next year. The production is holding up steadily also. During the first week of November three furnaces will be blown in, including No. 1 city furnace of the Sloss-Sheffield Co,. now being dried out after a thorough repairing; one of the Tennessee Coal, Iron & Railroad Co.'s furnaces, at Bessemer, and the Tutweiler Coal, Iron & Railroad Co.'s Vanderbilt furnace, also recently repaired and enlarged. The third furnace of the Woodward Iron Co. is nearing completion.

A prominent official of one of the companies hereabouts, in sizing up the present situation as to iron, said: "There is no anxiety to sell iron right now. Northern furnaces are selling under the quotations asked by Southern manufacturers. It is true some $11 per ton, No. 2 foundry, iron has been sold, but the aggregate amount disposed of at the price is not very large. The $11 per ton iron was sold also within a short distance of Birmingham, Chattanooga, Tenn., probably being the greatest distance for the higher-priced iron. With the Northern furnaces underselling Alabama furnaces, there is no anxiety to secure business right now, and indications point to a better quotation before the end of the year and a steady demand, even at the higher price. The production in Alabama is on the increase, and it is believed there will not be any too much iron manufactured. Two or three of the companies in this district have already sold their production for this year, while others have taken some orders, delivery to be made during the first quarter of the coming year. The prospects are very bright for the iron industry."

The following quotations are given in this section: No. 1 foundry, $11@$11.25; No. 2 foundry, $11; No. 3 foundry, $10; No. 4 foundry, $9.50; gray forge, $9@$9.25; No. 1 soft, $11@$11.25; No. 2 soft, $10.50@$11.

BY TELEGRAPH.

Birmingham, Ala., October 25.—The Republic Iron & Steel Co. will start up its Gate City rolling mills next Monday. These mills have been idle since July 2 last.

### Chicago. Oct. 24.

(*From Our Special Correspondent.*)

The market for pig iron is becoming a strong one as regards prices, though the volume of sales is not increasing rapidly. Agents of both southern and northern furnaces express satisfaction over a condition that grows better every day. Prices have advanced steadily, and quotations have been so uncertain that it is not easy to say what iron can be bought for today. The greater part of the business probably is being done at about $14@$14.50 for northern No. 2, and $11@$11.25 Birmingham, or $14.60@$14.90 for southern No. 2. In view of the preference of the local market for northern when prices run so close for the two kinds, it is probable that northern will continue relatively in better demand than southern locally.

Sales are for the first quarter of 1905 yet, and are not likely to change in this important respect until after the election, the approach of which is considered more significant by sellers than by buyers of pig iron to all appearances. The buyer, indeed, manifests confidence in business stability to a remarkable degree, according to men who have weathered many presidential election storms. He would be glad to contract up to next June, but finds it impossible to do so, except at a stiff advance in prices, which he is not willing to pay, or impossible on any terms in some cases. Spot lots are active, commanding 50c.@$1 premium.

Coke is firm, with sales numerous, though small.

### Cleveland. Oct. 25.

(*From Our Special Correspondent.*)

*Iron Ore.*—The buying for this year has stopped. The movement down the lakes is steady, at rates even with last quotations—70c. from Duluth; 65c. from Marquette, and 55c. from Escanaba. The movement from the lake docks to the furnaces has been heavier, the demand in that quarter being on the increase.

*Pig Iron.*—The buying of foundry pig iron has been enormous. It has consumed the possible output—with certain restrictions—for the remainder of this year and the first quarter of next, together with a good portion of the output during the second quarter of next year. It has also consumed the possible output of the idle furnaces, which are going into blast November 1. In addition, it has also consumed the major portion of the output of the basic and malleable furnaces for the remainder of this year and the first quarter of next. The causes are not far to seek. The southern furnaces are out of the market for the remainder of this year. Their product which came into this territory to be used in mixtures is not available. That leaves the home markets entirely dependent upon home production. While most of the buying during the past week has ranged between $12.25 and $13 in the Valleys, the average being about $12.50, the furnaces almost without exception, are now holding for $13.50 in the Valleys for No. 2 foundry. The malleable sales have been at $13, and basic furnaces are holding for $13 in the Valleys for all of their output, for whatever delivery.

*Finished Material.*—The bar iron market has been a little stronger, but its strength has been forced. The price of scrap iron has been advanced, and that has been boosting the price of bar iron more effectively than has the market demand. There has been a little better demand for sheets, but the market has been subject to a fierce competition, although it does not take the form of price-cutting. There has been good buying of both plates and structural shapes by the ship-building companies. The American Ship-Building Co. has orders for 14 ships on its books. The buying for these ships, however, has been restricted to the mills

which occasionally have boats to let. The general market for plates and shapes is rather dull. There has been some good buying in billets. In fact, the supply is short, and the mills are demanding better prices. On forging billets the price has gone to $23.90, Cleveland, which is $2 above the agreed price. The mills are finding themselves crowded in some respects.

*Old Materials.*—The market has been stronger during the past week for all grades.

**New York.** Oct. 26.

*Pig Iron.*—The market is firm at advanced prices, and buying is improving. We quote northern irons as follows at tidewater: No. 1X foundry, $15.45; No. 2, $14.95; forge, $14.20. Alabama irons are quoted at $12 at Birmingham, but most furnaces have withdrawn from this market.

*Bar Iron.*—There is more optimism among dealers, the market is stronger and an advance in prices is expected within two weeks. We quote refined bars at 1.445c. in carload lots delivered at Jersey City. Soft steel bars can be had for 1.40c.

*Plate.*—Buying has improved. We quote 1.545c. for ¼-in. tank plate in carloads at tidewater, with other grades in proportion.

*Steel Rails.*—Quotations are still $28 for standard sections, f. o. b. mills in lots of over 500 tons. Quotations for light rails have been increased by the chief producing concern. Central Pennsylvania mills ask $21 for 40-lb. and $24 for 16-lb.

*Structural Material.*—There is some improvement in the tone of the market. We quote on large lots at tidewater, 1.55@1.80c. for beams, angles and channels.

**Philadelphia.** Oct. 25.

(*From Our Special Correspondent.*)

Conditions in eastern Pennsylvania have improved to a remarkable extent within a week. Furnaces are blowing in; the recent additions to producing capacity in eastern Pennsylvania include the Hellerton furnace, the furnaces at Allentown and those at Reading and Topton, The Warwick Iron & Steel Co. contemplates resuming Pottstown furnace as soon as possible, and within 10 days three other furnaces will probably be either in blast, or preparations for blast will be in a forward condition. All of our pig iron people speak very hopefully of the trade. All kinds of iron are in good demand, even iron which has been dragging for months past. Some of the largest consumers in the country are making inquiries for supplies, and in some cases the deliveries are to extend up to the end of the second quarter of next year, if statements are to be relied upon.

It is definitely known that in some cases contracts have been placed for delivery up to April 1. No. 2 foundry iron is very strong, and in two or three recent cases orders for early delivery were booked only at a slight advance. It seems that election possibilities, crop conditions and other conditions have been anticipated. Quotations have not been nominally advanced, but business is being done on a basis of $13.50 for basic. Low phosphorus is under inquiry, and asking price is $18.50. Special brands of forge are held at $15, though average brands range from 25 to 50c. less. No. 2 foundry ranges from $14.50 to $15, and No. 1 hangs closely to $15.

*Billets.*—A good week's business is reported to-day in steel billets, and the prices named by makers are not questioned. Every mill from which information can be received is doing more business and is making more iron this week. Old quotations are continued on a basis of 1.43½c., car-load lots.

*Sheets.*—Sheet iron quotations to-day are as they have been, and more or less business is being taken for winter delivery, based on present prices.

*Merchant Pipe.*—Merchant pipe has advanced slightly, owing to higher priced pig iron. Some very large contracts are going to the mills from other markets.

*Plates.*—The plate market is showing more strength than it has for several months. Car-building is on the increase, a good deal of bridge work is being talked about, the boiler shops are doing much business.

**Pittsburg.** Oct. 25.

(*From Our Special Correspondent.*)

Unusually favorable conditions continue in the iron market, and further advances in prices have been made. While the outlook is remarkably bright, and buying promises to be heavy, there is nothing to indicate abnormal prices. The advances during the past week are due to steady buying, and the probability of some large steel interests coming into the market. The rumor late last week that the United States Steel Corporation was likely to buy a large tonnage of bessemer pig iron caused considerable interest in iron and steel circles. It was credited by some, but a number of pig iron producers who were spoken to on the subject declared that if the Corporation did come into the market with a big order, the purpose would be apparent. It was contended that the big company can produce all the iron it needs, and if it did buy, it would only be for the effect the purchase would have in stimulating the market, and pave the way for an advance in the prices of billets and sheet-bars. It is believed the Corporation has been sounding steel interests on a project to increase the prices of billets and bars, but it is not likely that the prices recently established will be disturbed for some time, at least not until the opening of the year. The pig iron market this week does not need any fictitious bolstering, as there seems to be plenty of bona fide business going. It is reported to-day that two large steel interests have just closed a deal with Valley furnaces for 30,000 tons of bessemer iron for delivery in the first quarter of next year. The names of the concerns and the price paid are not made public, but it is asserted that the price at which the sales were made was not much below $13, Valley furnace. A number of other sales have been made, and the price for this year's delivery is believed to be firm at $12.75, Valley; and while no announcement has been made, it is understood some sales were closed last week at $12.50, Valley. Prices of foundry and forge iron also have advanced; a number of sales were made and a large tonnage is under negotiation. It is believed that substantial prices for pig iron are assured for some time, owing to the fact that a number of merchant furnaces have an insufficient supply of ore to run them until the opening of navigation next year. It appears that the tonnage brought down this season has not been equally distributed. The tonnage, it is estimated, will not exceed 19,000,000 tons; this, with the stocks accumulated during the past two years, would be sufficient for all requirements, but the bulk is in the possession of the steel interests, and the efforts of some merchant furnaces to buy ore have so far been unsuccessful. The Lackawanna Steel Co. has been in the market for over a week for a big tonnage of bessemer iron, and is likely to place an order this week with Buffalo furnaces.

Additional orders for steel cars are being placed with the three steel car builders, and it is estimated this week that unfilled orders for from 20,000 to 25,000 cars are on the books. As a result, all the plate mills are busy, and will continue in steady operation for several months. The demand for structural material continues good, which is regarded as remarkable for this period of the year. Many important building projects have been planned, and the structural mills will start the new year under favorable auspices. There is some talk of an advance in wire prices, but nothing definite has been decided upon. It is said that wire nails, which were recently reduced from $1.80 to $1.60 a keg, will be advanced about the first of the month. The independent producers of pipe have followed the leading interest in advancing merchant pipe $2 a ton. There has been a decided improvement in trade, and the outlook is particularly bright. The tinplate market also has improved considerably, the large independent interest having orders on its books extending into next year.

*Pig Iron.*—The most important sale recorded was for 30,000 tons of bessemer pig iron, for delivery in the first quarter of next year, at a price said to be nearly $13, Valley furnace. Sales of bessemer for delivery this year aggregate about 15,000 tons, at $12.75, Valley furnace. A large number of inquiries have been received, and some important contracts may be closed before the end of the week. Several thousand tons of foundry and forge iron have been sold within the past few days, at higher prices than prevailed a week ago. Foundry No. 2 is now quoted above bessemer, being held at $13.85@$14.25, Pittsburg, and gray forge is quoted at $12.35@$12.50, Pittsburg.

*Steel.*—While there are a number of inquiries for billets, no sales of any consequence have been closed. The pool price of $19.50, Pittsburg, is fairly maintained, and there is some talk of an advance in the near future. Steel bars are firm, at 1.30@1.35c., and plates at 1.30@1.40c.

*Sheets.*—The market continues firm and some new business is being booked. Prices, however, remain unchanged. No. 28 gauge black sheets are still quoted at 2.10c., and galvanized at 3.10@3.15c.

*Ferro-Manganese.*—The market is not particularly strong, and 80% domestic is quoted at $40@$41 per ton.

**Cartagena, Spain.** Oct. 8.

(*Special Report of Barrington & Holt.*)

*Iron and Manganiferous Ores.*—Shipments for the week were one cargo, 2,050 tons dry ore, and one cargo, 2,075 tons manganiferous ore, both to Great Britain. The trade shows little change, although there is somewhat more request for ores for future delivery. Freight rates continue very strong, and tonnage is scarce.

Quotations for iron ores are as follows, per ton, f. o. b. Cartagena: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorus, 6s. 6d.@7s. 3d.; specular ore, 58%, 8s. 6d.; magnetic ore, 60%, 10s. 9d. for lumps, and 9s. for smalls. For manganiferous ores, quotations vary from 9s. 3d. for 35% iron and 12% manganese, up to 14s. for 20% iron and 20% manganese.

*Pyrite.*—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton, f. o. b. Cartagena. Business continues dull.

## CHEMICALS AND MINERALS.

New York, Oct. 26.

The building of new heavy chemical works suggests expansion and the determination of sellers to hold manufactures for higher prices indicates better profits in future. Momentarily 1905 contracts for bleaching powder and certain other industrial chemicals are being taken at a slight advance from last season.

In raw materials prices continue firm. Pyrite has been booked over next year at about quotations as below, and charters from Huelva, Spain, to Southern ports have been fixed at 10s.@10s. 6d. ($2.40@$2.52). In brimstone the absorbing topic is the rapid development of the domestic industry. It is learned that large paper mills have contracted for Louisiana sulphur, and the outlook for more business in this direction is promising. The paper mills are the largest consumers of Sicilian sulphur, and should the syndicate lose these orders, it can be said importations will eventually cease.

Oxalic acid will be among the products to be manufactured at the new works of the American Acid & Alkali Co., at Bradford, Pa.

While considering the expansion of the American sulphur mining industry, it is of interest to quote the opinion of Emil Fog & Sons, of Messina, on the position of the industry in Sicily. In their circular of October 1, the Messrs. Fog state that they have warned the Anglo-Sicilian Sulphur Co. of the danger of serious competition with the Louisiana mines, only to be treated with scorn. Now the Sicilian market is startled by the news that a steamer with 3,000 tons American brimstone has actually been shipped from New Orleans to Marseilles, and that other shipments are to be made to Antwerp and Hamburg. The Chambers of Commerce of Girgenti and Caltanissetta are agitating for government intervention, and at last the Anglo-Sicilian Co. has been aroused. Local newspapers propose to raise a fund of £2,000 by subscription as a premium to the inventor of new methods of employment of brimstone. Curiously, nobody thinks of the only remedy, namely, a radical reduction in prices. Current quotations are: Best unmixed seconds, in bulk, 80s. 9d. per long

ton; best thirds, 76s. 6d.; current thirds, 74s. 3d.; refined block, 89s. 9d.@92s. 6d.; refined roll, 95s. 9d.@101s. 3d., and sticks, 105s.@107s. 6d.; sublimed flowers, pure, in bags, 108s.; current, 100s. 3d.; commercial, 94s.; best seconds, ground, 90s.

Nitrate of soda is steadily advancing, and the report from the west coast that sales up to the spring of 1906 have been made at 7s. 2.5d. per qtl. for ordinary quality, intimates that the future market will be high. The market in America is firm, and the increasing consumption has made importers rather independent, for they have learned authoritatively that the future visible supply will fall short of recent calculations. Ocean freights from the west coast of South America to the United States are steady, and a charter has been taken for January sailing at 22s. ($5.28) to one port, and 23s. ($5.52) to two ports.

The statistical position of nitrate of soda for the eight months ending August 31 is officially reported in quintals of 101.4 lb. as below:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Production | 20,957,402 | 21,690,449 | I. 733,047 |
| Exports | 18,902,097 | 17,458,733 | D. 1,443,364 |
| Consumption in world | 25,423,995 | 25,995,288 | I. 571,293 |
| Visible supply, Aug. 31 | 17,798,758 | 16,949,807 | D. 848,951 |

It is noteworthy that the exports from Chile this year constituted only 81% of the production, whereas in 1903 the ratio was 90%. The increase in consumption is chiefly credited to the United States.

The foreign trade of Great Britain in the nine months ending September 30 is shown below:

| | Exports. | Imports. |
|---|---|---|
| Bleaching powder, lb | 65,359,728 | 20,187,504 |
| Borax, lb | | 31,153,922 |
| Brimstone, tons | | 14,890 |
| Cement, tons | 285,889 | 209,360 |
| Chemical manures, tons | 316,282 | |
| Copper sulphate, tons | 66,040 | |
| Nitrate of soda, tons | | 90,928 |
| Phosphates, tons | | 316,363 |
| Pyrite, tons | | 569,014 |
| Salt, tons | 483,760 | |
| Saltpetre, lb | | 20,791,672 |
| Soda ash, lb | 106,172,632 | |
| Soda, bicarb., lb | 26,199,264 | |
| Soda, caustic, lb | 108,416,208 | 25,777,024 |
| Soda crystals, lb | 17,302,656 | |
| Soda, sulphate, lb | 73,576,616 | |
| Soda, other sorts, lb | 27,780,480 | |
| Sulphuric acid, lb | 9,832,032 | |

Noteworthy features this year are an increase of 16,094 tons, or 32.2%, in exports of copper sulphate, and a decrease of 23,367 tons, or 9%, in the shipment of cement.

Quotations for wholesale quantities are as below, f. o. b. New York, unless otherwise specified:

| | |
|---|---|
| Brimstone, Domestic 2ds, long ton | $21.20 |
| Domestic 99.5% long ton (For Baltimore and Phila. add 25c.; Portland, 15c.) | 21.50 |
| Foreign 2ds, long ton | 21.50 |
| Foreign 3ds, long ton | 20.875 |
| Pyrite, Am. 42@44%, lump, unit, at shipping port | 10@10½c. |
| Am., fines, unit, at shipping port | 8½@9c. |
| Spanish, 46@52%, lump, unit | 10@11½c. |
| Spanish, fines, unit | 9@10c. |
| Nitrate of soda, 95%, 100 lb | 2.275@2.30 |
| 96%, 100 lb | 2.30@2.32½ |
| Sulphate of ammonia, gas liquor, 100 lb | 3.025@3.10 |
| Bleaching powder, prime, 100 lb | 1.20@ 1.25 |
| Cyanide, lb. | 19@20c. |
| Copper sulphate, 100 lb | 4.75@ 5.00 |
| Nitric acid, 36°, 100 lb | 4.75 |
| 38°, 100 lb | 4.75 |
| 40°, 100 lb | 5.00 |
| 42°, 100 lb | 5.50 |
| Oxalic acid, com'l, 100 lb | 5.00@5.375 |
| Sulphuric acid, 50°, bulk, ton | 13.50@14.50 |
| 60°, 100 lb | 1.05 |
| 60°, bulk, ton | 18.00@20.00 |
| 66°, 100 lb | 1.20 |
| 66°, bulk, ton | 21.00@23.00 |
| Phosphate, Fla. rock, 77@80%, f.o.b. shipping port | 7.25@7.50 |
| Fla. rock, 77@80%, c.i.f. Europe | 10.53@11.70 |
| Fla. land pebble, 68@73%, f.o.b. shipping port | 3.75@4.00 |
| Fla. land pebble, 68@73%, c.i.f. Europe | 7.70@8.40 |
| Tenn. 78@80%, f.o.b. Mt. Pleasant | 4.00@4.25 |
| Tenn., c.i.f. Europe | 10.27@10.67 |
| Tenn., 78%, f.o.b. | 3.75@4.00 |
| Tenn., 75%, f.o.b. | 3.25@3.50 |
| So. Car., land rock, f.o.b. Ashley River | 3.25@3.50 |
| So. Car., river rock, f.o.b. | 3.00@3.25 |
| So. Car., river rock, c.i.f. Europe | 6.33@6.56 |
| Algerian, 63@70%, c.i.f. | 6.93@7.59 |
| Algerian, 58@63%, c.i.f. | 6.15@6.60 |
| Algerian, 53@58%, c.i.f. | 5.05@5.20 |
| Tunis, c. i. f. | 6.33@6.50 |
| Christmas isle, 80@85%, c.i.f. | 12.87@14.11 |
| Ocean isle, 82@88%, c.i.f. | 13.60@14.45 |

**Liverpool.** Oct. 12.

(*Special Report of Joseph P. Brunner & Co.*)

Soda ash is unchanged. For tierces the nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@ £6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s.. Bags, 5s. per ton, under price for tierces. Soda crystals are in good request. For barrels, £3 7s. 6d. per ton, less 5%, is generally quoted, with an allowance of 7s. per ton in bags, with special terms for a few favored markets. Caustic soda is in fair demand, and prices are firm as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton. Special terms for the Continent and a few other export quarters. Bleaching powder is firm at £4 15s.@£5 per ton, net cash, for hardwood packages, as to market, while export demand is quiet, deliveries to the home trade are good, and there is an absence of stocks. Chlorate of potash is steady at 3d.@ 3⅛d. per lb., net cash, for English make, as to quantity and market. Bicarbonate of soda finds a fairly ready outlet at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs; with usual allowances for larger packages, also special quotations for a few favored markets. Sulphate of ammonia receives a fair amount of attention from buyers, and is steady at £12 5s.@£12 7s. 6d. per ton, less 2½% for good gray 24 and 25% in double bags f. o. b. here, as to quality. Nitrate of soda is firmly held on spot at from £10 10s. per ton for ordinary, up to £10 17s. 6d. per ton for best refined, for double bags f. o. b. here, less 2½%, while for spring delivery a premium of about 10s. per ton over spot figures is demanded.

## METAL MARKET.

New York, Oct. 26.

### Gold and Silver Exports and Imports.

At all United States Ports in September and year.

| Metal. | September. | | Year. | |
|---|---|---|---|---|
| | 1903. | 1904. | 1903. | 1904. |
| Gold: | | | | |
| Exports | $998,076 | $2,744,448 | $41,536,851 | $83,039,908 |
| Imports | 5,184,858 | 4,241,035 | 31,640,672 | 68,694,670 |
| Excess | I. $4,186,782 | I. $1,496,587 | E. $9,896,179 | E$14,345,238 |
| Silver: | | | | |
| Exports | 2,368,015 | 3,378,775 | 24,883,435 | 39,129,920 |
| Imports | 1,687,239 | 2,003,036 | 16,601,269 | 19,677,231 |
| Excess | E. $680,776 | E. $1,375,739 | E. $8,282,166 | E$19,452,689 |

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

### Gold and Silver Exports and Imports, New York.

For the week ending October 22 and for years from January 1st.

| Period. | Gold. | | Silver. | |
|---|---|---|---|---|
| | Exports. | Imports. | Exports. | Imports. |
| Week | | $456,143 | $592,629 | $35,727 |
| 1904 | $73,177,464 | 5,397,077 | 30,924,362 | 834,650 |
| 1903 | 31,522,990 | 6,671,844 | 24,560,796 | 3,133,228 |
| 1902 | 24,722,118 | 3,234,547 | 20,930,629 | 942,651 |

The demand for gold abroad and the upward movement of foreign exchange here make it quite probable that some exports of gold to Europe may be made at an early date. One shipment of $1,250,000 has already been made to France.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending October 22, gives the following totals, comparisons being made with the corresponding week of 1903:

| | 1903. | 1904. |
|---|---|---|
| Loans and discounts | $907,099,000 | $1,137,930,400 |
| Deposits | 889,714,600 | 1,199,796,700 |
| Circulation | 45,862,600 | 42,990,800 |
| Specie | 171,706,600 | 240,215,500 |
| Legal tenders | 68,666,500 | 77,587,600 |
| Total reserve | $240,373,100 | $317,803,100 |
| Legal requirements | 222,428,650 | 299,949,175 |
| Balance surplus | $17,944,450 | $17,853,925 |

Changes for the week this year were increases of $3,917,000 in loans and discounts, $6,559,000 in deposits, $702,800 in circulation, $2,470,500 in specie, $1,065,300 in legal tenders, and $4,896,050 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

| | 1903. Gold. | 1903. Silver. | 1904. Gold. | 1904. Silver. |
|---|---|---|---|---|
| N. Y. Ass'n. | $171,706,600 | ..... | $240,215,500 | ..... |
| England | 163,131,350 | ..... | 184,265,575 | ..... |
| France | 485,391,790 | $221,586,515 | 522,177,750 | $220,126,040 |
| Germany | 172,765,000 | 57,190,000 | 155,335,000 | 54,580,000 |
| Spain | 72,600,000 | 96,220,000 | 74,085,000 | 100,220,000 |
| Netherlands | 20,272,000 | 31,608,500 | 27,474,500 | 30,276,500 |
| Belgium | 15,540,000 | 7,770,000 | 16,253,335 | 8,226,665 |
| Italy | 101,560,000 | 11,996,000 | 110,205,000 | 17,122,500 |
| Russia | 384,460,000 | 34,400,000 | 488,730,000 | 36,160,000 |
| Austria | 229,015,000 | 61,720,000 | 241,240,000 | 60,445,000 |

The returns of the Associated Banks of New York are of date Ocotber 22, and the others October 20, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver has been very steady. Amounts offering have not been large, and consequently were easily absorbed. Should any special inquiries come to the surface at present it would tend to make a higher market.

The United States Assay Office in New York reports receipts of 118,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to October 13 are reported by Messrs. Pixley & Abell's circular as follows:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| India | £4,778,975 | £7,968,498 | I. £3,189,523 |
| China | 302,123 | 372,722 | I. 70,599 |
| Straits | 721,879 | 58,103 | D. 663,776 |
| Total | £5,802,977 | £8,399,323 | I. £2,596,346 |

Receipts for the week this year were £159,000 in bar silver from New York, £4,000 from the West Indies, and £6,000 from Australia; total, £169,000. Shipments were £219,000 in bar silver to India.

Indian exchange has been firmer, in consequence of an increased activity in exports, and a strong demand for money in the presidencies. The Council bills offered in London were taken at an average of 16.03d. per rupee. At the same time, the demand for silver from India has been rather light.

The movement of gold and silver in Great Britain for the nine months ending September 30 is given by the Board of Trade returns as follows:

| Gold. | 1903. | 1904. | Changes |
|---|---|---|---|
| Imports | £20,847,902 | £24,771,950 | I. £3,924,048 |
| Exports | 16,759,475 | 18,484,613 | I. 1,725,138 |
| Excess, imports | £4,088,427 | £6,287,337 | I. £2,198,910 |
| Silver: | | | |
| Imports | £7,033,499 | £9,342,875 | I. £2,309,376 |
| Exports | 7,764,222 | 10,254,439 | I. 2,490,217 |
| Excess, exports | £730,723 | £911,564 | I. £180,841 |

Of the silver imported this year, £6,895,957, or 73.8% of the total, is credited to the United States.

### Prices of Foreign Coins.

| | Bid. | Asked. |
|---|---|---|
| Mexican dollars | $0.46½ | $0.47½ |
| Peruvian soles and Chilean pesos | .42 | .43½ |
| Victoria sovereigns | 4.85 | 4.87 |
| Twenty francs | 3.87 | 3.90 |
| Spanish 25 pesetas | 4.78 | 4.82 |

## OTHER METALS.

SILVER AND STERLING EXCHANGE.

| October. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. | October | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. |
|---|---|---|---|---|---|---|---|
| 20 | 4.85¼ | 58 | 26 13/16 | 24 | 4.85⅞ | 58⅛ | 26 13/16 |
| 21 | 4.85¼ | 58⅛ | 26¾ | 25 | 4.86⅛ | 58⅛ | 26 13/16 |
| 22 | 4.85¼ | 58⅛ | 26¾ | 26 | 4.86⅛ | 58⅛ | 26 13/16 |

New York quotations are for fine silver; per ounce Troy. London prices are for sterling silver .925 fine.

**Daily Prices of Metals in New York.**

| October. | Copper. Lake, Cts. per lb. | Copper. Electrolytic, Cts. per lb. | Copper. Cathodes, Cts. per lb. | Copper. London, £ per ton. | Tin. Cts. per lb. | Lead. Cts. per lb. | Spelter. New York, Cts. per lb. | Spelter. St. Louis, Cts. per lb. |
|---|---|---|---|---|---|---|---|---|
| 20 | 13 @13¼ | 13 @13¼ | 12¾ @12¾ | 60½ | 28¼ | 4.20 | 5.25 | 5.10 |
| 21 | 13¼ " 13½ | 13 " 13¼ | 12¾ " 12¾ | 60½ | 28¼ | 4.20 | 5.25 | 5.12½ |
| 22 | 13¼ " 13½ | 13 " 13¼ | 12¾ " 12¾ | .... | 28¼ | 4.20 | 5.25 | 5.12½ |
| 24 | 13¼ " 13½ | 13¼ " 13¼ | 12¾ " 13 | 60½ | 28¼ | 4.20 | 5.30 | 5.15 |
| 25 | 13¼ " 13½ | 13¼ " 13¼ | 12¾ " 13 | 60½ | 28¼ | 4.20 | 5.30 | 5.15 |
| 26 | 13¼ " 13½ | 13¼ " 13¼ | 12¾ " 13 | 60½ @28¼ | 28¼ | 4.20 | 5.30 | 5.15 |

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

*Copper.*—During the week under review, the market has again displayed considerable strength. The buying movement both here and abroad remains heavy for spot cash as well as future delivery. China and Japan are also continuing to send over orders. Under the circumstances, prices show a further improvement, the closing quotations being given as 13¼@13½ for Lake copper; 13⅛@13¼ for electrolytic in ingots, cakes and wirebars, 12⅞ @13 in cathodes; 12¾@13 for casting copper.

The market for standard copper in London, which closed last week at £60 2s. 6d. opened on Monday at £60 5s., advanced on Tuesday to £60 10s., and the closing quotations on Wednesday are cabled as £60 15s.@£60 17s. 6d. for spot, £61@£61 2s. 6d. for three months.

The political complications abroad have so far had no influence whatever upon the market.

Refined and manufactured sorts we quote: English tough, £63@£63 5s.; best selected, £64@£64 5s.; strong sheets, £72 5s.@£72 10s.; India sheets, £70 5s.@£70 10s.; yellow metal, 6¼d.@6⅜d.

Exports of copper from New York and Baltimore for the week ending October 25 were 6,868 long tons, chiefly to Germany, Holland and France. The shipments to China were 461 tons. There were also exported to Italy $2,500 worth of matte, quantity not given. Imports at New York for the week of October 21 were 198 tons copper, and $10,128 worth of ore.

Imports and exports of copper in Great Britain for the nine months ending September 30 are reported as follows, in long tons, the totals giving the contents of all material in fine copper:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Copper ore | 66,061 | 61,900 | D. 4,161 |
| Matte and precipitate | 55,462 | 49,411 | D. 6,051 |
| Fine copper | 46,746 | 68,532 | I. 21,786 |
| Totals, fine copper | 81,083 | 99,428 | I. 18,345 |
| Exports | 38,447 | 36,887 | D. 1,560 |
| Balance, imports | 42,636 | 62,541 | I. 19,905 |

Of the imports this year, 146 tons of ore, 3,984 tons of matte and 36,692 tons of fine copper were from the United States, against 396 tons of ore, 3,629 tons of matte and 15,638 tons of fine copper last year.

*Tin* has ruled very quiet indeed throughout the week, and prices moved within very narrow limits. Arrivals have been rather heavy, but consumers are only covering their immediate requirements. The closing quotations are given as 28⅝@28¾ for spot, 28½@ 28⅝ for futures.

The London market, which closed last week at £131, opened on Monday at £130 15s., advanced on Tuesday to £131, and the closing quotations on Wednesday are cabled as £131 5s. @£131 7s. 6d. for spot, £130 7s. 6d.@£130 10s. for three months.

Imports of tin into Great Britain, with reexports of foreign metal, for the nine months ending September 30, are reported as follows, in long tons:

| | 1903 | 1904. | Changes. |
|---|---|---|---|
| Straits | 20,887 | 21,975 | I. 1,088 |
| Australia | 3,417 | 3,105 | D. 312 |
| Other countries | 2,367 | 1,954 | D. 413 |
| Total imports | 26,671 | 27,034 | I. 363 |
| Re-exports | 18,067 | 20,126 | I. 2,059 |
| Net imports | 8,604 | 6,908 | D. 1,696 |

The small increase shown this year was entirely in Straits tin. The re-exports were largely to the United States.

*Lead* remains very strong, with a good consumptive demand. Quotations are unchanged at 4.20 New York, 4.12½c. St. Louis.

The foreign market is dull, Spanish lead being quoted at £12 7s. 6d., English £12 10s.

Imports and exports of lead in Great Britain for the nine months ending September 30 were as follows, in long tons:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| United States | 30,553 | 28,393 | D. 2,160 |
| Spain | 81,325 | 83,457 | I. 2,132 |
| Australia | 44,568 | 55,532 | I. 10,964 |
| Germany | 10,292 | 13,725 | I. 3,433 |
| Other countries | 6,781 | 6,916 | I. 135 |
| Total imports | 173,519 | 188,023 | I. 14,504 |
| Exports | 25,433 | 26,246 | I. 813 |
| Balance, imports | 148,086 | 161,777 | I. 13,691 |

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

*St. Louis Lead Market.*—The John Wahl Commission Company telegraphs us as follows: Lead continues strong and fairly active. Missouri brands are selling for 4.17½ to 4.20c., East St. Louis.

*Spanish Lead Market.*—Messrs. Barrington & Holt report from Cartagena, Spain, under date of October 8, that the price of silver has been 14.50 reales per oz. Exchange is 34.48 pesetas to £1. Local quotation for pig lead has been 66.75 reales per quintal, which, on current exchange, is equal to £10 16s. 9d. per long ton, f. o. b. Cartagena. Exports were 326,735 kg. argentiferous lead to Marseilles. There was also a shipment of 10 tons lead ore to Liverpool.

*Spelter* is very strong and advancing, the demand for galvanizing as well as brass purposes being very brisk indeed. The closing quotations are given as 5.15 St. Louis, 5.30 New York.

The foreign market is very strong, good ordinaries being quoted at £23 7s. 6d., specials £23 12s. 6d.

Imports and exports of spelter in Great Britain for the nine months ending September 30 are reported as follows, in long tons:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Spelter | 62,276 | 64,459 | I. 2,183 |
| Zinc sheets, etc | 16,751 | 16,974 | I. 223 |
| Total imports | 78,027 | 81,433 | I. 2,406 |
| Exports | 5,795 | 5,833 | I. 38 |
| Balance, imports | 73,232 | 75,600 | I. 2,368 |

This shows only a comparatively small change in the trade this year.

*St. Louis Spelter Market.*—The John Wahl Commission Company telegraphs us as follows: Spelter is very firm, and latest sales are on a basis of 5.17½ to 5.20c., East St. Louis. Offerings are light, and are likely to be so for some time to come.

*Spanish Zinc Ore Market.*—Messrs. Barrington & Holt write from Cartagena, Spain, under date of October 8, that there has been no material change. Ores are still in strong request at unchanged prices, quotations being 67 pesetas for blende, 35% zinc, and 47 pesetas for calamine, 30% zinc. Exports for the week were 1,950 tons blende to Stettin and 2,800 tons to Antwerp.

*Antimony.*—The improvement mentioned in our last issue has been maintained, but the demand is nothing out of the ordinary. The closing quotations are: 7@7⅛ for Cookson's; 6⅝@6¾ for Hallett's; 6⅜@6½ for Hungarian, Italian, Japanese, French, U. S. and Chinese.

*Nickel.*—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

*Platinum.*—Quotations are higher, at $19.50 per ounce.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

*Quicksilver.*—Prices are low. In New York large lots have been offered at $40 per flask (75 lb.), with $41@$42 quoted for smaller orders. The San Francisco price is now $41.50 @$42. London price is £7 15s., with the same quotation from second-hands.

Imports of quicksilver into Great Britain, with re-exports of foreign metal, for the nine months ending September 30, were as follows, in pounds:

| | 1903. | 1904. | Changes. |
|---|---|---|---|
| Imports | 2,541,051 | 2,416,066 | D. 124,985 |
| Re-exports | 1,122,515 | 1,308,912 | I. 186,397 |
| Net imports | 1,418,536 | 1,107,154 | D. 311,382 |

There was a decrease of 22.2% in the net imports this year.

*Minor Metals and Alloys.*—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

| | Per lb. | | Per lb. |
|---|---|---|---|
| Aluminum, | | | |
| No. 1. 99% ingots | 33@37c | Ferro-Chrom. (74%) | 12½c. |
| No. 2. 99% ingots | 31@34c | Ferro-Tungsten (37%) | 45c. |
| Rolled Sheets | 4c. up | Magnesium, pure | |
| Alum-bronze | 20@23c. | (N. Y.) | $1.60 |
| Nickel-alum | 33@39c. | Manganese, (98@99% | |
| Bismuth | $2.10 | N. Y.) | 75c. |
| Chr'm'm, pure (N.Y.) | 80c. | Manganese, Cu., (30@70% | |
| Copper, red oxide | 50c. | N. Y.) | 40c. |
| Fe.-Molybd'm (50%) | $1.00 | Molybdenum, (98@99% | |
| Ferro-Titanium (20@25% | | N. Y.) | $2.75 |
| N. Y.) | 75c. | Phosphorus, foreign | 45c. |
| Ferro-Vanadium, (25% | | Phosphurus, American | 70c. |
| N. Y.) | $3.00 | Sodium metal | 50c. |
| | | Tungsten (best) | $1.25 |

Differences in price depend chiefly upon size and conditions of order.

**Missouri Ore Market.** Oct. 22.

*(From Our Special Correspondent.)*

Again the highest price for zinc concentrates was $44 per ton, and the assay basis price $38@ $40 per ton of 60% zinc. Early in the week an effort was made by some of the purchasing agents to put the highest assay price down $1, but the demand was too strong, and the market firmed toward the end of the week, with rumors of a $41 base price. The Lanyon Zinc Co. came into the market for double the shipment of last week, and the M. & H. Zinc Co. and the Edgar Zinc Co. purchased an increased supply.

Lead continues in strong demand at unchanged prices, selling at $53.50 per ton all week.

Following are the shipments of zinc and lead from the various camps of the district for the week:

| | Zinc lb. | Lead lb. | Value. |
|---|---|---|---|
| Joplin | 3,379,950 | 380,700 | $77,980 |
| Webb City-Carterville | 2,719,730 | 294,140 | 48,100 |
| Duenweg | 1,278,740 | 227,680 | 31,500 |
| Galena-Empire | 791,930 | 113,260 | 18,100 |
| Granby | 710,160 | 38,000 | 10,580 |
| Carthage | 468,710 | ..... | 10,050 |
| Alba-Neck | 418,840 | 4,110 | 8,480 |
| Oronogo | 346,930 | 3,750 | 6,920 |
| Aurora | 428,170 | 22,730 | 6,310 |
| Badger | 166,670 | 16,350 | 4,150 |
| Zincite | 186,700 | ..... | 3,730 |
| Spurgeon | 100,990 | 20,600 | 3,300 |
| Prosperity | 38,320 | 90,740 | 3,170 |
| Diamond | 105,010 | ..... | 2,010 |
| Baxter Springs | 68,000 | 15,380 | 1,630 |
| Sherwood | 72,780 | ..... | 1,380 |
| Reeds | 66,640 | ..... | 1,270 |
| Beef Branch | 40,490 | 20,870 | 770 |
| Gillam, Ark | 40,000 | ..... | 680 |
| Total sales | 11,438,760 | 1,255,310 | $240,110 |
| 43 weeks | 425,751,090 | 54,056,590 | 8,742,010 |
| 43 weeks last year | 403,066,880 | 47,501,820 | 8,197,335 |
| Zinc value, the week, | $206,070; | 43 weeks, | 7,278,050 |
| Lead value, the week, | 34,040; | 43 weeks, | 1,463,960 |

## Average Prices of Metals per lb., New York.

| Mo. | Tin. | | Lead. | | Spelter. | |
|---|---|---|---|---|---|---|
| | 1903. | 1904. | 1903. | 1904. | 1903. | 1904. |
| Jan ... | 28.33 | 28.845 | 4.075 | 4.347 | 4.865 | 4.863 |
| Feb ... | 29.43 | 28.087 | 4.075 | 4.375 | 5.043 | 4.916 |
| Mar... | 30.15 | 28.317 | 4.442 | 4.475 | 5.349 | 5.057 |
| April .. | 29.81 | 28.132 | 4.567 | 4.475 | 5.550 | 5.219 |
| May... | 29.51 | 27.718 | 4.325 | 4.423 | 5.639 | 5.031 |
| June .. | 28.34 | 26.325 | 4.210 | 4.196 | 5.697 | 4.760 |
| July... | 27.68 | 26.573 | 4.075 | 4.192 | 5.662 | 4.873 |
| Aug. .. | 28.29 | 27.012 | 4.075 | 4.111 | 5.725 | 4.866 |
| Sept .. | 26.77 | 27.780 | 4.243 | 4.200 | 5.686 | 5.046 |
| Oct ... | 25.92 | ..... | 4.375 | ..... | 5.510 | ..... |
| Nov. .. | 25.42 | ..... | 4.218 | ..... | 5.038 | ..... |
| Dec ... | 27.41 | ..... | 4.162 | ..... | 4.731 | ..... |
| Year... | 28.09 | ..... | 4.237 | ..... | 5.400 | ..... |

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c; September, 4.896c.

## Average Prices of Copper.

| Mo. | New York. | | | | London. | |
|---|---|---|---|---|---|---|
| | Electrolytic. | | Lake. | | Standard. | |
| | 1903. | 1904. | 1903. | 1904. | 1903. | 1904. |
| Jan .. | 12.159 | 12.410 | 12.361 | 12.553 | 53.52 | 57.500 |
| Feb. . | 12.778 | 12.063 | 12.901 | 12.245 | 57.34 | 56.500 |
| Mar. . | 14.416 | 12.299 | 14.572 | 12.551 | 63.85 | 57.321 |
| April . | 14.454 | 12.923 | 14.642 | 13.120 | 61.72 | 58.247 |
| May.. | 14.435 | 12.758 | 14.618 | 13.000 | 61.73 | 57.321 |
| June . | 13.942 | 12.269 | 14.212 | 12.399 | 57.30 | 56.398 |
| July.. | 13.094 | 12.380 | 13.341 | 12.505 | 56.64 | 57.256 |
| Aug. . | 12.962 | 12.343 | 13.159 | 12.468 | 58.44 | 56.952 |
| Sept . | 13.205 | 12.495 | 13.345 | 12.620 | 56.82 | 57.645 |
| Oct .. | 12.801 | ..... | 12.954 | ..... | 55.60 | ..... |
| Nov. . | 12,617 | ..... | 12.813 | ..... | 56.30 | ..... |
| Dec .. | 11,952 | ..... | 12,084 | ..... | 56.36 | ..... |
| Year.. | 13.235 | ..... | 13.417 | ..... | 57.97 | ..... |

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

## Average Prices of Silver, per ounce Troy.

| Mo. | 1902. | | 1903. | | 1904. | |
|---|---|---|---|---|---|---|
| | London, Pence. | N. Y., Cents. | London, Pence. | N. Y., Cents. | London, Pence. | N. Y., Cents. |
| Jan ... | 25.62 | 55.56 | 21.98 | 47.57 | 26.423 | 57.055 |
| Feb ... | 25.41 | 55.09 | 22.11 | 47.89 | 26.665 | 57.592 |
| Mar ... | 25.00 | 54.23 | 22.49 | 48.72 | 26.164 | 56.741 |
| April.. | 24.34 | 52.72 | 23.38 | 50.56 | 24.974 | 54.202 |
| May.. | 23.71 | 51.31 | 24.89 | 54.11 | 25.578 | 55.430 |
| June .. | 24.17 | 52.36 | 24.29 | 52.86 | 25.644 | 55.672 |
| July... | 24.38 | 52.88 | 24.86 | 53.92 | 26.760 | 58.095 |
| Aug. .. | 24.23 | 52.52 | 25.63 | 55.36 | 26.591 | 57.806 |
| Sept .. | 23.88 | 51.52 | 26.75 | 58.00 | 26.349 | 57.120 |
| Oct ... | 23.40 | 50.57 | 27.89 | 60.36 | ..... | ..... |
| Nov. .. | 22.70 | 49.07 | 27.01 | 58.11 | ..... | ..... |
| Dec ... | 22.21 | 48.03 | 25.73 | 55.375 | ..... | ..... |
| Year... | 24.09 | 52.16 | 24.75 | 53.57 | ..... | ..... |

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

## DIVIDENDS.

| Company. | Payable. | Rate. | Amount. |
|---|---|---|---|
| Alaska Mexican ..... | Oct. 28 | $0.30 | $54,000 |
| Alaska Treadwell. .... | Oct. 28 | 1.00 | 200,000 |
| †Amalgamated C. .... | Nov. 28 | .50 | 769,420 |
| ‡Anaconda Copper ... | Nov. 18 | .50 | 600,000 |
| *Bartolome de Medina | Oct. 30 | .69 | 1,380 |
| †Camp Bird ..... | Oct. 31 | .18 | 147,600 |
| *Central Lead ..... | Oct. 28 | .50 | 5,000 |
| De Lamar, Ida. ..... | Oct. 28 | .48 | 32,246 |
| †Doe Run Lead ..... | Oct. 15 | 1.50 | 22,500 |
| Esperanza, Mex. .... | Oct. 31 | .12 | 54,600 |
| Gold King, Colo. .... | Nov. 15 | .01 | 9,369 |
| Greene Con. Copper. .. | Oct. 28 | .30 | 259,200 |
| *Homestake, S. D. .... | Oct. 25 | .25 | 54,600 |
| Iron Silver, Colo. .... | Oct. 31 | .10 | 50,000 |
| ‡Mont. Ore Purch .... | Nov. 14 | 2.00 | 162,000 |
| N. S. St. & C., com. ... | Nov. 1 | 3.00 | 150,000 |
| N. S. St. & C., pf .... | Nov. 1 | 2.00 | 20,600 |
| *Oil City Petrol ..... | Nov. 1 | .00½ | 2,500 |
| *Pacific Coast Borax. . | Oct. 29 | 1.00 | 19,000 |
| †Phila. Nat. Gas., com. | Nov. 1 | .75 | 398,888 |
| *Twenty-Eight Oil ... | Nov. 1 | .15 | 9,000 |

*Monthly. †Quarterly. ‡Semi-annually.

## ASSESSMENTS.

| Company. | Delinq. | Sale. | Amt. |
|---|---|---|---|
| Alta, Nev. ..... | Nov. 12 | ..... | .05 |
| Best & Belcher ... | Nov. 4 | Nov. 25 | .10 |
| Big Casino, Cal ... | Nov. 12 | ..... | .03 |
| Brunswick Con .... | Nov. 3 | ..... | .03 |
| Bullion, Nev ..... | Nov. 11 | Dec. 1 | .05 |
| Caledonia, Nev .... | Nov. 21 | ..... | .10 |
| California, Utah .. | Oct. 12 | Nov. 26 | .06 |
| Con. Cal. & Va. .... | Oct. 31 | Nov. 21 | .25 |
| Crown Point, Nev. | Nov. 9 | Dec. 1 | .10 |
| Damascus, Cal. .... | Oct. 28 | ..... | .10 |
| Golden West, Cal . | Oct. 28 | Nov. 28 | .01 |
| Hale & Norcross .. | Oct. 31 | Nov. 30 | .10 |
| Las Goteras, Mex. | Oct. 29 | ..... | .03 |
| N. Y. Bonanza .... | Oct. 18 | Nov. 7 | .03 |
| Orleans Con., Cal . | Sept. 15 | Oct. 31 | .07 |
| Red Slide, Cal .... | Nov. 12 | Nov. 30 | .05 |
| Santa Eulalia Expl | Nov. 12 | ..... | .05 |
| S. Nevada, Nev. .. | Nov. 17 | ..... | .10 |
| Solden, Cal. ..... | Nov. 2 | ..... | .10 |
| South Eureka, Cal. | Oct. 29 | ..... | .02 |
| Trade Dollar, Utah | Oct. 18 | Nov. 9 | .10 |
| Tule Belle, Cal. .... | Nov. 1 | ..... | .02 |
| Union Con., Nev. .. | Nov. 9 | Nov. 29 | .10 |
| West Comstock. .. | Nov. 15 | ..... | .05 |

## NEW YORK.

| Company. | Par val. | Oct. 19 | | Oct. 20 | | Oct. 21 | | Oct. 22 | | Oct. 24 | | Oct. 25 | | Sales. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H. | L. | H. | L. | H. | L. | H. | L. | H. | L. | H. | L. | |
| Acacia ..... | 1 | .... | .... | .05 | .... | .... | .... | .... | .... | .05 | .... | .... | .... | 1,000 |
| Amalgamated, C.. | 100 | 65½ | 63¾ | 64½ | 62½ | 64½ | 63¾ | 68 | 64¼ | 68¼ | 66½ | 67½ | 66¼ | 327,645 |
| Anaconda ..... | 25 | 98½ | 95½ | 95 | 94 | †95 | 94 | 99 | .... | 99 | .... | 101½ | 99½ | 9,510 |
| Anaconda G. .... | 5 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Best & Belcher.. | 3 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Brunswick ..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Caledonia ..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .45 | .... | .... | .... | 100 |
| Challenge..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Chollar..... | 2½ | .... | .... | .16 | .... | .16 | .... | .... | .... | .17 | .16 | .16 | .... | 1,000 |
| C. K. & N ..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Confidence..... | 3 | .... | .... | .... | .... | .85 | .84 | .... | .... | .... | .... | .... | .... | 300 |
| Con. Cal. & Va... | 2½ | 1.65 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 100 |
| Con. Imperial.... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Cripple Creek Con. | 1 | .... | .... | .... | .... | .10 | .09 | .09 | .... | .... | .... | .09 | .... | 1,600 |
| Crown Point.... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Elkton Con..... | 1 | .65 | .... | .... | .... | .65 | .... | .... | .... | .64 | .... | .65 | .... | 700 |
| El Paso..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Gold Sovereign .. | 1 | .07 | .... | .07 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1,500 |
| Gould & Curry ... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Greene Con..... | 10 | 20½ | 20 | 20½ | 20½ | †20½ | 20½ | 20½ | 20½ | 20½ | 20½ | 20½ | 20½ | 31,250 |
| Hale & Norcross. | 3 | .... | .... | .65 | .62 | .... | .... | .66 | .65 | .... | .... | .... | .... | 800 |
| Homestake..... | 100 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Horn Silver ..... | 20 | .... | .... | .... | .... | .... | .... | 1.55 | .... | .... | .... | .... | .... | 100 |
| Isabella..... | 1 | .21 | .... | .21 | .... | .... | .... | .... | .... | .20 | .... | .... | .... | 2,500 |
| Justice..... | 2 | .... | .... | .... | .... | .08 | .... | .06 | .... | .... | .... | .07 | .06 | 1,400 |
| Little Chief..... | 50 | .... | .... | .... | .... | .05 | .... | .... | .... | .... | .... | .... | .... | 300 |
| Mexican..... | 3 | 1.05 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 100 |
| Mollie Gibson.... | 5 | .... | .... | .... | .... | .... | .... | .04½ | .... | .... | .... | .... | .... | 1,000 |
| Moon Anchor .... | 5 | .08 | .... | .08 | .... | .08 | .... | .... | .... | .... | .... | .08 | .... | 4,000 |
| Ontario ..... | 100 | .... | .... | .... | .... | .... | .... | .... | .... | 3.75 | .... | .... | .... | 20 |
| Ophir..... | 3 | 2.25 | .... | .... | .... | 2.35 | .... | .... | .... | 2.30 | 2.25 | 2.30 | 2.20 | 700 |
| Overman..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .15 | .... | 300 |
| Pharmacist..... | 1 | .... | .... | .04 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1,000 |
| Phœnix..... | 1 | .24 | .19 | .20 | .... | .21 | .17 | .22 | .21 | .21 | .19 | .20 | .19 | '14,820 |
| Portland ..... | 1 | 1.60 | .... | 1.60 | .... | 1.70 | 1.65 | .... | .... | 1.70 | .... | 1.70 | .... | 1,000 |
| Potosi ..... | 1 | .... | .... | .... | .... | .12 | .11 | .... | .... | .12 | .... | .12 | .... | 700 |
| Savage ..... | 3 | .29 | .... | .27 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 500 |
| Sierra Nevada .. | 3 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .27 | .26 | 1,000 |
| Silver Hill..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .35 | .... | .55 | .... | 400 |
| Small Hopes..... | 20 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Standard..... | 10 | 1.95 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 100 |
| Tennessee C..... | 10 | 32½ | 32½ | .... | .... | 32½ | 32½ | .... | .... | 33½ | 33 | 33½ | 33 | 1,000 |
| Union Con..... | 1 | .34 | .... | .... | .... | .36 | .... | .... | .... | .... | .... | .... | .... | 400 |
| Union Copper.... | 25 | ¼ | .... | .... | .... | .... | .... | ¼ | .... | ¼ | 1/16 | ¼ | .... | 2,550 |
| United Copper .. | 100 | .... | .... | .... | .... | .... | .... | .... | .... | 6 | .... | .... | .... | 100 |
| White Knob..... | 10 | ¼ | ¼ | ¼ | .... | ¼ | ¼ | ¼ | ¼ | .... | .... | .... | .... | 3,600 |
| Work..... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .08 | .... | 300 |
| Yellow Jacket .. | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |

Total sales, 413,395 shares. †Ex-dividend.

## SALT LAKE CITY.*

Oct. 22

| Company. | Par Val | High. | Low. | Sales. | Company. | Par Val | High. | Low. | Sales. |
|---|---|---|---|---|---|---|---|---|---|
| Beck-Tunnel Con. | $ 1 | .09¼ | .09¼ | 2,000 | Lower Mammoth. | $ 1 | .15 | .12½ | 6,550 |
| Butler-Liberal ... | 1 | .07¼ | .07½ | 1,000 | May Day..... | 2½ | .36 | .27½ | 84,825 |
| Carisa..... | 1 | .11¼ | .11 | 7,100 | Mammoth ..... | 1 | 1.90 | 1.86 | 1,600 |
| Columbus Con .... | 1 | 1.52½ | 1.48 | 600 | N. Y. Bonanza.... | 1 | .09 | .04½ | 37,671 |
| Con. Mercur ..... | 5 | .45 | .42½ | 550 | Sacramento..... | 5 | .12½ | .12 | 1,300 |
| Century..... | 1 | .35 | .35 | 400 | Silver Shield..... | 1 | .05 | .04½ | 5,500 |
| Daly..... | 1 | 2.20 | 2.15 | 400 | Soulh Swansea.... | 1 | .07 | .06½ | 300 |
| Daly-Judge..... | 20 | 4.50 | 4.40 | 400 | Star Con..... | 1 | .18 | .15 | 14,200 |
| Daly-West..... | 20 | 13.50 | 12.00 | 610 | Tetro..... | 1 | .27 | .27 | 400 |
| Eagle & Blue Bell. | 1 | .90 | .85 | 300 | Uncle Sam Con... | 1 | .23½ | .20½ | 5,200 |
| Grand Central .... | 5 | 3.90 | 3.90 | 50 | Victoria..... | 1 | 1.70 | 1.40 | 400 |
| Ingot..... | 1 | ¼ | ¼ | 1,500 | Victor Con. ..... | 1 | .04 | .03¾ | 8,000 |
| Little Chief..... | 1 | .04 | .02½ | 39,000 | Yankee Con ..... | 1 | .37 | .34 | 2,400 |

*By our Special Correspondent. Total sales, 222,256 shares.

## BOSTON, MASS.

| Company. | Par val. | Oct. 19 | | Oct. 20 | | Oct. 21 | | Oct. 22 | | Oct. 24 | | Oct. 25 | | Sales. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H. | L. | H. | L. | H. | L. | H. | L. | H. | L. | H. | L. | |
| Adventure Con... | $25 | 3¾ | 3½ | 3¾ | .... | 3¾ | 3½ | .... | .... | 4 | 3¾ | 4½ | 4 | 2,180 |
| Alloues..... | 25 | 12½ | 11½ | 12½ | 12 | .... | .... | 12½ | 12 | 12½ | 11½ | 12 | .... | 4,353 |
| Amalgamated .... | 100 | 65¼ | 63½ | 64½ | 63 | 64½ | 63¾ | 67½ | 64¼ | 68¼ | 67 | 67½ | 66½ | 33,143 |
| Am. Z. L. & Sm.. | 25 | 13½ | .... | 13 | 12½ | 13½ | 13½ | 13½ | .... | 13½ | .... | 13 | .... | 560 |
| Anaconda..... | 25 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 25 | .... | 30 |
| Arnold..... | 25 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Atlantic ..... | 25 | 14 | 13¾ | 14½ | 13½ | 14½ | 14½ | 14½ | 14½ | 15 | 14½ | 15½ | 14½ | 7,948 |
| Bingham Con. ... | 50 | 30½ | 30 | 31½ | 30½ | 32½ | 31½ | 33 | 32½ | 33¼ | 32½ | 33½ | 32½ | 22,162 |
| Bonanza ..... | 10 | .53 | .50 | .... | .... | .... | .... | .55 | .... | .... | .... | .50 | .... | 650 |
| Boston Con..... | 5 | 6½ | .... | 6½ | 6 | 6½ | .... | 6½ | 6½ | 6½ | 6½ | 6½ | 6½ | 3,090 |
| Calumet & Hecla . | 25 | 555 | 550 | 552 | 550 | 560 | 557½ | 560 | 557½ | 562 | .... | 570 | 565 | 117 |
| Catalpa ..... | 10 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .09 | .... | 100 |
| Centennial ..... | 25 | 27½ | 27 | 27 | .... | 28 | 27 | 29½ | 28½ | 29½ | 28½ | 30 | 29 | 14,105 |
| Central Oil..... | 25 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Con. Mercur .... | 5 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .45 | .... | 120 |
| Copper Range .. | 100 | 62 | 60½ | 61 | 59½ | 61½ | 61 | 64½ | 61½ | 65 | 64 | 65½ | 63 | 25,274 |
| Daly-West ..... | 20 | 13½ | 12½ | 12½ | 12½ | 12½ | .... | 12½ | .... | 12½ | 12½ | 12½ | 12 | 1,455 |
| Dominion C..... | 100 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 58 | .... | 65 |
| Dominion C. pf... | 100 | 111½ | .... | 111 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 10 |
| Dominion I. & S. | 100 | 15 | .... | 15½ | 14½ | 14½ | .... | .... | .... | 14½ | .... | .... | .... | 850 |
| Elm River ..... | 12 | 2½ | .... | .... | .... | .... | .... | 2½ | .... | 2½ | 2½ | 2½ | .... | 450 |
| Franklin ..... | 25 | .... | .... | .... | .... | 8½ | 8½ | 9 | 8½ | 9 | .... | 9 | .... | 660 |
| Granby Con..... | 10 | 3½ | .... | 3½ | .... | 3½ | 3⅛ | 3½ | 3½ | 3½ | 3½ | 3½ | 3½ | 10,067 |
| Greene Con. C.... | 10 | 20½ | 20 | 20½ | 20¼ | *20½ | .... | 20½ | 20½ | 21 | 20½ | 20½ | 20½ | 7,760 |
| Guanajuato Con.. | 5 | 2 | .... | 2 | .... | 2 | .... | 2⅛ | 2 | 2½ | 2½ | 2½ | 2½ | 4,450 |
| Humboldt..... | 25 | .... | .... | .... | .... | .75 | .... | .... | .... | .87½ | .... | .... | .... | 700 |
| Isle Royal Con... | 25 | 21 | .... | 21½ | 20 | 21½ | 20½ | 22½ | 21½ | 23 | 21½ | 23½ | 22 | 5,319 |
| Mass. Con. ..... | 25 | 5½ | 5 | 5 | .... | .... | .... | 5½ | 5 | 5½ | 5½ | 5½ | 5½ | 3,981 |
| Mayflower..... | 25 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Michigan..... | 25 | 7½ | 7½ | 7½ | 7½ | 7½ | 7½ | 7½ | 7½ | 9½ | 8 | 9½ | 9 | 5,109 |
| Mohawk ..... | 25 | 51 | 49½ | 50½ | 49½ | 50½ | 50½ | 52½ | 50½ | 52½ | 51½ | 52½ | 51½ | 7,323 |
| Mont. Coal & C .. | 25 | 5½ | 5½ | .... | .... | 5½ | .... | .... | .... | 5½ | .... | .... | .... | 500 |
| Mont. & Boston. | 5 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| New Idria..... | 5 | 10 | .... | 10 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 240 |
| Old Colony..... | 25 | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | 25 |
| Old Dominion ... | 25 | 20½ | 20 | 20½ | 20 | 21 | 20½ | 22½ | 21 | 22½ | 21½ | 23½ | 22½ | 6.360 |
| Osceola ..... | 25 | 88½ | 88 | 88½ | 87½ | 89½ | 88½ | 90½ | 90 | 90½ | 90 | 91 | 89½ | 4,168 |
| Parrot..... | 10 | 25½ | 25 | 25 | 24½ | 25½ | .... | 26½ | 25½ | 26½ | 26 | 27½ | 26½ | 3,901 |
| Phœnix Con. .... | 25 | .... | .... | 1½ | 1½ | .... | .... | 1½ | .... | 1½ | 1½ | 1½ | 1½ | 570 |
| Quincy ..... | 25 | 94½ | 94 | 95 | 94 | 96 | .... | 97 | .... | 100 | 96 | 99½ | 99½ | 332 |
| Rhode Island.... | 25 | .... | .... | .... | .... | 1½ | .... | .... | .... | 1½ | .... | 1½ | 1 | 330 |
| Santa Fe..... | 10 | 2 | 1⅛ | .... | .... | 1½ | .... | 1⅛ | .... | 2 | 1½ | 2 | 1½ | 1,685 |
| Shannon ..... | 10 | 5½ | 5½ | 5½ | 5½ | 6 | 5½ | 6½ | 5½ | 6½ | 6 | 6½ | 6 | 10,585 |
| Tamarack..... | 25 | 120 | .... | 120 | 119 | 119 | 118½ | 123 | 120 | 120 | 119 | 120 | .... | 477 |
| Tecumseh ..... | 25 | .... | .... | .... | .... | 1 | .... | .... | .... | 1½ | 1 | .... | .... | 305 |
| Trinity ..... | 25 | 9½ | 8½ | 9½ | 8½ | 9 | .... | 10½ | 9 | 11½ | 10½ | 12½ | 11½ | 15,407 |
| Union C. L'd & Mg | 25 | 3½ | .... | .... | .... | .... | .... | .... | .... | 4½ | 4 | .... | .... | 650 |
| United States.... | 10 | 25 | 24 | 24½ | 23½ | 24½ | 23½ | 24½ | 24 | 25½ | 24½ | 25½ | 24½ | 30,605 |
| U.S.Coal & Oil.... | 25 | 11½ | 11½ | 11½ | 11½ | 11½ | 11½ | .... | .... | 11½ | .... | 11½ | 11 | 1,855 |
| Utah Con ..... | 5 | 41½ | 41½ | 41½ | 41½ | 42½ | 41½ | 42½ | 41½ | 43½ | 42½ | 43½ | 42½ | 16,151 |
| Victoria..... | 25 | 4 | 3½ | 3½ | 3½ | 3½ | 3½ | 3½ | .... | 4 | 3½ | 4½ | 3½ | 4,749 |
| Winona..... | 25 | 9 | .... | 9 | .... | 8½ | .... | 9½ | 9 | 9½ | 9½ | 10½ | 9½ | 2,988 |
| Wolverine..... | 25 | 96 | .... | 96 | .... | 96 | .... | 98½ | 96 | 99 | 97½ | 99½ | 98½ | 1,014 |
| Wyandot ..... | 25 | 2½ | 2½ | 2⅛ | 2 | 2½ | 2 | .... | .... | 2½ | 2½ | 2½ | 2 | 2,070 |

Total sales, 266,998 shares.

## COAL, IRON AND INDUSTRIAL STOCKS.

| Company. | Par val. | Oct. 19 | | Oct. 20 | | Oct. 21 | | Oct. 22 | | Oct. 24 | | Oct. 25 | | Sales. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H. | L. | H. | L. | H. | L. | H. | L. | H. | L. | H. | L. | |
| Allis-Chalmers ... | $100 | .... | .... | 12 | 11½ | 14 | 13 | 14 | 13½ | 15 | 14 | 14½ | 14¾ | 5,053 |
| Allis-Chalmers pf. | 100 | 50¾ | 50½ | .... | .... | 62 | 59 | 61½ | 61 | 61½ | .... | 61 | 60½ | 1,500 |
| Am. Agri. Chem .... | 100 | .... | .... | .... | .... | .... | .... | 20½ | 20½ | 21½ | 20½ | .... | .... | 900 |
| Am. Sm. & Ref. .. | 100 | 67½ | 66½ | 67½ | 66½ | 68½ | 67½ | 70½ | 68½ | 72½ | 70½ | 73½ | 71½ | 100,475 |
| Preferred ..... | 100 | 109½ | 109 | 109½ | 108½ | 110½ | 109½ | 111 | 110 | 115 | 111½ | 114½ | 113½ | 8,055 |
| †Cambria Iron ... | 50 | .... | .... | 47 | .... | .... | .... | 47 | 46½ | 47 | .... | 46½ | .... | 79 |
| †Cambria Steel... | 50 | 24½ | 23½ | 24½ | 23½ | 24½ | 24 | 24½ | 24½ | 24½ | 24 | 24½ | 23½ | 4,790 |
| Col. Fuel & Iron.. | 100 | 39½ | 37 | 40 | 36 | 41½ | 39½ | 41 | 40 | 42 | 40½ | 44½ | 39½ | 145,110 |
| Col. Fuel & Iron pf | 100 | .... | .... | .... | .... | 65 | .... | .... | .... | 68 | 65 | 71 | 69 | 1,080 |
| Col. & H. C. & I . | 100 | 14 | 13½ | 13½ | 13½ | 13½ | .... | 13½ | .... | 14½ | 13½ | 15 | 14½ | 4,250 |
| †Lehigh C. & N... | 50 | 91½ | 91 | 91 | 90½ | 92 | 90½ | 91½ | 91 | 92½ | 92 | 92 | .... | 4,432 |
| *Mong. R. Coal... | 50 | .... | .... | 8 | .... | .... | .... | .... | .... | .... | .... | 8½ | 8 | 100 |
| *Mong. R. Coal pf. | 50 | .... | .... | 23 | .... | 22 | .... | .... | .... | .... | .... | .... | .... | 190 |
| National Lead ... | 100 | 26 | 24½ | 25½ | 24½ | 25½ | 24½ | 25½ | 24½ | 25 | 24 | 23½ | 22½ | 35,770 |
| Preferred ..... | 100 | 97 | .... | 98 | 97½ | .... | .... | 97 | .... | 97½ | 96½ | 96 | 95 | 1,805 |
| †Phila. Nat. Gas.. | 50 | 43 | 42½ | 42½ | 41½ | 42½ | 42½ | 42½ | .... | 42½ | 42½ | 43 | 42½ | 6,965 |
| Preferred ..... | 50 | 47½ | 47 | 47 | 46½ | 47 | 46½ | 46½ | .... | 47 | .... | 47 | .... | 616 |
| *Pittsburg Coal .. | 100 | 16½ | .... | 17 | .... | 17½ | 16½ | .... | .... | .... | .... | .... | .... | 970 |
| Preferred ..... | 100 | .... | .... | 72½ | 72 | 72½ | 71½ | 72 | 71½ | 72 | 71 | 71½ | 71 | 1,828 |
| Republic I. & S .. | 100 | 12½ | 12½ | 12½ | 11½ | 12½ | 12 | 13½ | 12 | 12½ | 12 | 12½ | 12 | 18,230 |
| Preferred ..... | 100 | 54 | 52½ | 52½ | 52 | 52½ | 52½ | 53 | 52½ | 54½ | 52½ | 54½ | 53 | 10,350 |
| Sloss-Shef. S. & I . | 100 | 46½ | 45½ | 45½ | 45½ | 46 | 45½ | 46½ | .... | 46½ | 46 | 47½ | 46½ | 6,300 |
| Preferred ..... | 100 | 91 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 96 | 92 | 190 |
| Standard Oil..... | 100 | 649½ | 647½ | 647 | .... | 648½ | 647 | 648 | .... | 648 | 647½ | 647½ | 647 | 193 |
| Tenn. C. I. & R.R. | 100 | 57 | 55½ | 56½ | 55½ | 57½ | 56½ | 57½ | 56½ | 57½ | 56½ | 58½ | 56½ | 26,055 |
| U. S. Steel Corp .. | 100 | 22½ | 20½ | 21½ | 20 | 21½ | 20½ | 21½ | 20½ | 21½ | 20½ | 22½ | 20½ | 374,602 |
| Preferred ..... | 100 | 82½ | 81 | 81½ | 80½ | 82½ | 80½ | 82½ | 81½ | 82½ | 81 | 83½ | 81½ | 524,670 |
| Va.-Car Chem.... | 100 | 35½ | 35 | 34½ | .... | 36½ | 35 | 37 | 36½ | 39 | 36½ | 38½ | 36 | 24,135 |
| Preferred ..... | 100 | 108½ | .... | 108½ | .... | 110½ | 108½ | 110½ | 110 | 112 | 110 | 112 | 111 | 9,470 |

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange
Total sales, 1,318,163 shares. ‡Ex-dividend.

# STOCK QUOTATIONS.

## SAN FRANCISCO.*

| Company. | Location. | Oct. 13 H. | Oct. 13 L. | Oct. 14 H. | Oct. 14 L. | Oct. 15 H. | Oct. 15 L. | Oct. 17 H. | Oct. 17 L. | Oct. 18 H. | Oct. 18 L. | Oct. 19 H. | Oct. 19 L. | Sales. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MacNamara | Nev | .36 | .35 | .36 | .34 | .35 | ... | .35 | ... | .36 | .35 | .33 | .29 | 22,700 |
| Mont. Tonopah | Nev | 197½ | ... | 1.95 | 192½ | 192½ | 1.90 | 1.95 | ... | 197½ | .195 | 192½ | ... | 3,200 |
| Ton. Belmont | Nev | .63 | ... | .64 | .63 | ... | ... | .65 | ... | .67 | .66 | .70 | .66 | 7,600 |
| Ton. Midway | Nev | .46 | ... | .45 | .44 | .43 | .42 | .42 | .41 | .42 | .40 | .40 | .39 | 9,000 |
| Ton. Mg. Co | Nev | ... | ... | 837½ | ... | ... | ... | 9.00 | ... | ... | ... | 962½ | ... | 300 |
| Ton. North Star | Nev | .20 | ... | .19 | ... | .18 | ... | ... | ... | .19 | .05 | ... | ... | 3,500 |

*San Francisco & Tonopah Exchange. Total sales, 46,300 shares.

## SAN FRANCISCO (By Telegraph).

| Company. | October. 24 | October. 25 | Company. | October. 24 | October. 25 |
|---|---|---|---|---|---|
| Belcher | $0.27 | $0.27 | Gould & Curry | $0.17 | $0.14 |
| Best & Belcher | 1.15 | 1.10 | Hale & Norcross | .58 | .59 |
| Caledonia | .40 | .39 | Mexican | 1.10 | 1.10 |
| Challenge Con. | .17 | .18 | Ophir | 2.25 | 2.20 |
| Chollar | .18 | .18 | Overman | 16 | .14 |
| Confidence | .85 | .80 | Sierra Nevada | .27 | .26 |
| Con. California & Virginia | 1.25 | 1.25 | Union Con | .36 | .37 |
| Crown Point | .08 | .08 | Yellow Jacket | .18 | .18 |

## COLORADO SPRINGS (By Telegraph).

| Company. | Oct. 24 H. | Oct. 24 L. | Oct. 25 H. | Oct. 25 L. | Company. | Oct. 24 H. | Oct. 24 L. | Oct. 25 H. | Oct. 25 L. |
|---|---|---|---|---|---|---|---|---|---|
| Anaconda | .12 | .10 | .12 | .10 | Jack Pot | .05 | .03½ | .05 | .03½ |
| C. K. & N | .22 | .20 | .22 | .20½ | Last Dollar | .25 | ... | .25 | ... |
| Cripple Ck. Con. | .09½ | .09½ | .09½ | .09½ | Mollie Gibson | .04 | .03 | .04 | .03½ |
| Doctor Jack Pot | .04½ | .04½ | ... | ... | Moon Anchor | .07½ | ... | .07½ | ... |
| Elkton Con | .66½ | .65½ | .66 | .65½ | Old Gold | .10 | .08½ | .09½ | .08½ |
| El Paso | 1.16 | 1.14½ | 1.16 | 1.15 | Pharmacist | .04 | .03½ | .03½ | .03½ |
| Gold Dollar | .06½ | .06½ | .06½ | .06½ | Portland | 1.73 | 1.66 | 1.70 | 1.65 |
| Gold Sovereign | .06½ | .06½ | .06½ | .06 | Vindicator Con | .80 | .70 | .70 | .67½ |
| Isabella | .20 | .19½ | .19½ | .19½ | Work | .09 | .08½ | .08½ | .08½ |

## ST. LOUIS, MO.* Oct. 22

| Company. | Par Val. | Bid. | Ask. | Company. | Par Val. | Bid. | Ask. |
|---|---|---|---|---|---|---|---|
| Am. Nettie, Colo | $10 | $0.17 | $0.25 | Columbia Lead, Mo. | $10 | $0.25 | $1.00 |
| Catherine Lead, Mo | 10 | .50 | 1.00 | Con. Coal, Ill | 100 | 14.00 | 15.50 |
| Central Coal & C | 100 | 59.50 | 62.50 | Doe Run Lead, Mo | 100 | 110.00 | 115.00 |
| Central C. & C., Pf | 100 | 70.00 | 71.50 | Granite Bimet., Mt. | 10 | .32 | .35 |
| Central Lead, Mo | 100 | 110.00 | 117.00 | St. Joe Lead, Mo | 10 | 14.00 | 15.00 |

*By our Special Correspondent.

## DULUTH, MINN. Oct. 15.

| Company. | Par Val. | Bid. | Ask. | Company. | Par Val. | Bid. | Ask. |
|---|---|---|---|---|---|---|---|
| Calumet & Arizona | $10 | $98.00 | $99.50 | Lake Sup. & Pitts | $10 | $52.50 | $53.00 |
| Calumet & Bisbee | 10 | ... | 2.00 | Pitts. & Duluth Dev | 15 | 78.50 | 80.00 |
| Calumet & Pittsburg | 10 | 43.00 | 44.00 | Shakespeare | 1 | ... | .20 |
| Higgins Development | 10 | ... | 1.00 | United Mexican | 10 | ... | .25 |
| Junction Development | 15 | 53.00 | 53.50 | Wolverine & Arizona | 10 | | 1.50 |

## MONTREAL.* Oct. 21.

| Company. | Par Val. | High | Low | Sales | Company. | Par Val. | High | Low | Sales |
|---|---|---|---|---|---|---|---|---|---|
| Dominion Coal | 100 | 56.50 | 56.00 | 195 | Montreal Steel | 100 | 50.00 | 35.00 | ... |
| Dom. Coal, Pf | 100 | 112.00 | ... | 45 | Mont'l Steel, Pf | 100 | 90.00 | ... | ... |
| Dom. I. & St | 100 | 15.00 | 14.12½ | 865 | Nova Scotia St | 100 | 64.25 | 63.00 | 235 |
| Dom. I. & St., Pf. | 100 | 42.75 | 42.25 | 67 | N. S. Steel, Pf | 100 | 106.37½ | 105.50 | 55 |

*Montreal Stock Exchange. Total sales, 1,462 shares.

## MEXICO. Oct. 14

| Company. | Shares Issued | Prices, Mex. Bid. | Prices, Mex. Ask. | Company. | Shares Issued | Prices, Mex. Bid. | Prices, Mex. Ask. |
|---|---|---|---|---|---|---|---|
| DURANGO: | | | | Soledad, aviada | $670 | $985 | $995 |
| Ca. Min. de Penoles | 2,500 | $2,700 | $3,200 | Sorpresa, aviada | 960 | 300 | 305 |
| San Andres de la Sierra | 200 | 10,000 | ... | MEXICO: | | | |
| GUANAJUATO: | | | | Aldebarren | 2,000 | 70 | 75 |
| Cinco Senores y An. aviadoras | 2,000 | 34 | 36 | Buen Despacho | 3,000 | 55 | 57 |
| Cinco, Senores y An. aviada | 400 | 34 | 36 | Dos Estrellas | 3,000 | 2,750 | 2,800 |
| Providencia, San Juan de la Luz | 6,000 | 100 | 115 | La Esperanza (El Oro) | 3,000 | 1,500 | 1,500 |
| GUERRERO: | | | | Santa Ana, Esperanza | 2,400 | 15 | 30 |
| Garduno y Anexas | 7,200 | 35 | 40 | NUEVO LEON: | | | |
| HIDALGO: | | | | La Fraternal | 1,000 | 580 | 620 |
| Amistad y Con | 9,600 | 73½ | 74½ | Norias de Bajan | 1,000 | 880 | 920 |
| Carmen, aviada | 1,100 | 150 | 170 | SAN LUIS POTOSI: | | | |
| Guadalupe Fresnillo Mill | 1,000 | 170 | 200 | Concepcion y An | 3,000 | 60 | 90 |
| GuadalupeFresnillo Mine | 1,400 | 70 | 80 | El Barreno, aviadora | 2,000 | 85 | 87 |
| Maravillas y An., aviador | 1,680 | 100 | 130 | Sta.Maria de la Paz | 9,600 | 209 | 210 |
| Maravillas el Lobo | 1,000 | 130 | 180 | ZACATECAS: | | | |
| Refugio, aviada | 12,800 | 680 | 740 | Asturiana y An | 2,500 | 10 | 15 |
| Sta.Gertrudis y An. aviadas | 9,600 | 12 | 14 | Candelaria y Pinos | 2,500 | 38 | 43 |
| Sta.Gertrudis y An. aviadora | 28,800 | 74 | 75 | San Carlos y Anexas | 2,500 | 40 | 45 |
| San Rafael y An., Trompillo | 1,200 | 2,000 | 2,050 | Sta.Maria de Gaud | 2,500 | 83 | 90 |
| San Rafael y An., aviada | 1,200 | 705 | 720 | MISCELLANEOUS: | | | |
| | | | | Bartolome de Medina | 2,000 | 99 | 102 |
| | | | | Naica (Chihuahua) | 100 | 11,000 | 13,000 |
| | | | | Natividad(Oxaca) aviadora | 1,800 | 95 | 100 |
| | | | | San Francisco Hac. | 6,000 | 96 | 105 |
| | | | | Union Hacienda | 3,000 | 325 | 355 |

## LONDON. Oct. 7

| Company. | Shares Issued. | Par value. £ | s. | d. | Latest dividend. Amt. s. | d. | Date. | Quotations. Buyers. £ | s. | d. | Sellers. £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| American: | | | | | | | | | | | | | |
| Alaska-Treadwell | 200,000 | 5 | 0 | 0 | 4 | 0 | Oct., 1904 | 4 | 12 | 6 | 4 | 17 | 6 |
| Anaconda | 1,200,000 | 5 | 0 | 0 | 2 | 0 | Nov., 1904 | 4 | 18 | 9 | 5 | 1 | 3 |
| Camp Bird | 820,000 | 1 | 0 | 0 | | 9 | Nov., 1904 | 1 | 8 | 3 | 1 | 8 | 9 |
| Copiapo | 112,500 | 2 | 0 | 0 | 6 | 10 | May, 1903 | 1 | 0 | 0 | 1 | 5 | 0 |
| De Lamar | 80,000 | 1 | 0 | 0 | 2 | 0 | Oct., 1904 | | 15 | 0 | | 17 | 6 |
| El Oro | 1,080,000 | 1 | 0 | 0 | | 9 | July, 1904 | | 18 | 9 | 1 | 1 | 3 |
| Esperanza | 455,000 | 1 | 0 | 0 | | 6 | Oct., 1904 | | | | | | |
| Frontino & Bolivia | 128,662 | 1 | 0 | 0 | 3 | 0 | July, 1901 | | 8 | 6 | | 9 | 6 |
| Le Roi | 200,000 | 5 | 0 | 0 | 5 | 0 | Nov., 1899 | | 13 | 9 | | 16 | 3 |
| Le Roi No. 2 | 120,000 | 5 | 0 | 0 | 1 | 0 | June, 1904 | | 11 | 3 | | 13 | 9 |
| Palmarejo & Mexican | 445,000 | 1 | 0 | 0 | rts. | | Apr., 1903 | | 8 | 0 | | 8 | 6 |
| Standard | 500,000 | | 4 | 0 | | 2½ | Sept., 1903 | | 2 | 0 | | 3 | 0 |
| Stratton's Independence | 1,000,007 | 1 | 0 | 0 | | 6 | Dec., 1903 | | 3 | 3 | | 3 | 9 |
| St. John del Rey | 546,265 | 1 | 0 | 0 | | 6 | Dec., 1903 | | 12 | 6 | | 13 | 6 |
| Tomboy | 300,000 | 1 | 0 | 0 | 1 | 0 | June, 1902 | | 17 | 6 | 1 | 2 | 6 |
| Ymir | 200,000 | 1 | 0 | 0 | 1 | 0 | Mar., 1902 | | 2 | 6 | | 5 | 0 |
| European: | | | | | | | | | | | | | |
| Linares | 15,000 | 3 | 0 | 0 | 5 | 0 | Sept., 1904 | 3 | 5 | 0 | 3 | 15 | 0 |
| Mason & Barry | 185,172 | 1 | 0 | 0 | 7 | 0 | May, 1904 | 2 | 17 | 6 | 3 | 2 | 6 |
| Rio Tinto | 325,000 | 5 | 0 | 0 | 37 | 6 | May, 1904 | 15 | 10 | 0 | 57 | 15 | 0 |
| Rio Tinto, preferred | 325,000 | 5 | 0 | 0 | 2 | 6 | May, 1904 | 6 | 2 | 6 | 6 | 7 | 6 |
| Tharsis | 625,000 | 2 | 0 | 0 | 7 | 0 | May, 1904 | 4 | 12 | 6 | 4 | 17 | 6 |
| West Australian: | | | | | | | | | | | | | |
| Associated | 495,388 | 1 | 0 | 0 | 2 | 6 | July, 1904 | 1 | 16 | 3 | 1 | 18 | 9 |
| Cosmopolitan | 400,000 | 1 | 0 | 0 | 1 | 0 | Apr., 1904 | | 6 | 3 | | 6 | 9 |
| Golden Horseshoe | 300,000 | 5 | 0 | 0 | 6 | 0 | Aug., 1904 | 6 | 3 | 9 | 6 | 6 | 3 |
| Great Boulder | 1,750,000 | | 2 | 0 | | 9 | Sept., 1904 | | 19 | 3 | | 19 | 9 |
| Gt. Boulder Persever'ce | 1,400,007 | 1 | 0 | 0 | 1 | 0 | Sept., 1904 | | 12 | 3 | | 12 | 9 |
| Great Fingall | 250,000 | 1 | 0 | 0 | 7 | 0 | Oct., 1904 | 7 | 13 | 9 | 7 | 16 | 3 |
| Ivanhoe | 200,000 | 5 | 0 | 0 | 5 | 0 | Oct., 1904 | 7 | 6 | 3 | 7 | 8 | 9 |
| Kalgurli | 120,000 | 1 | 0 | 0 | 2 | 6 | Oct., 1904 | 5 | 3 | 9 | 5 | 6 | 3 |
| Lake View | 250,000 | 1 | 0 | 0 | 1 | 6 | Oct., 1904 | 1 | 2 | 6 | 1 | 5 | 0 |
| Oroya-Brownhill | 450,000 | 1 | 0 | 0 | 3 | 0 | Sept., 1904 | 3 | 8 | 9 | 3 | 11 | 3 |
| Miscellaneous: | | | | | | | | | | | | | |
| Brilliant Central | 100,000 | 1 | 0 | 0 | 1 | 0 | Oct., 1904 | 2 | 0 | 0 | 2 | 5 | 0 |
| Briseis | 600,000 | 1 | 0 | 0 | ... | | ... | | 11 | 9 | | 12 | 3 |
| Broken Hill | 960,000 | | 8 | 0 | 1 | 0 | Aug., 1904 | 2 | 0 | 0 | 2 | 1 | 3 |
| Mt. Lyell | 275,000 | 3 | 0 | 0 | 1 | 3 | June, 1904 | | 10 | 6 | | 11 | 6 |
| *Mt. Morgan | 1,000,000 | 1 | 0 | 0 | | 3 | Oct., 1904 | 2 | 5 | 0 | 2 | 15 | 0 |
| Waihi | 497,412 | 1 | 0 | 0 | 2 | 6 | Sept., 1904 | 5 | 13 | 9 | 5 | 16 | 3 |
| Indian: | | | | | | | | | | | | | |
| Champion Reef | 513,832 | | 10 | 0 | 1 | 4 | Sept., 1904 | 1 | 11 | 0 | 1 | 12 | 0 |
| Mysore | 566,043 | 10 | 0 | 0 | 4 | 6 | Nov., 1904 | 6 | 10 | 0 | 6 | 12 | 6 |
| Nundydroog | 484,000 | 10 | 0 | 0 | 1 | 3 | July, 1904 | 1 | 15 | 0 | 1 | 16 | 3 |
| Ooregum | 343,000 | 10 | 0 | 0 | 1 | 3 | Aug., 1904 | | 13 | 6 | | 14 | 6 |
| Ooregum, pfd | 240,000 | 10 | 0 | 0 | | 4 | Aug., 1904 | 1 | 2 | 6 | 1 | 5 | 0 |
| South African: | | | | | | | | | | | | | |
| Angelo | 600,000 | 1 | 0 | 0 | 7 | 0 | Aug., 1904 | 6 | 17 | 6 | 7 | 0 | 0 |
| Bonanza | 200,000 | 1 | 0 | 0 | 8 | 0 | Aug., 1904 | 1 | 2 | 6 | 1 | 5 | 0 |
| British South Africa | 4,436,019 | 1 | 0 | 0 | rts. | | May, 1899 | 1 | 7 | 7 | 1 | 8 | 9 |
| Cape Copper | 300,000 | 2 | 0 | 0 | 2 | 6 | July, 1904 | 4 | 2 | 6 | 4 | 5 | 0 |
| Cape Copper, pfd | 75,000 | 2 | 0 | 0 | 2 | 6 | July, 1904 | 3 | 17 | 6 | 4 | 2 | 6 |
| City & Suburban | 340,000 | 4 | 0 | 0 | 4 | 0 | Aug., 1904 | 4 | 18 | 9 | 5 | 1 | 3 |
| Consol. Gold-Fields | 2,000,000 | 1 | 0 | 0 | ... | | ... | 6 | 10 | 0 | 6 | 12 | 6 |
| Crown Reef | 120,000 | 1 | 0 | 0 | 9 | 0 | Oct., 1904 | 15 | 5 | 0 | 15 | 15 | 0 |
| De Beers, preferred | 800,000 | 2 | 10 | 0 | 10 | 0 | Aug., 1904 | 17 | 18 | 9 | 18 | 1 | 3 |
| De Beers, deferred | 1,000,000 | 2 | 10 | 0 | 12 | 6 | Aug., 1904 | 17 | 18 | 9 | 18 | 1 | 3 |
| East Rand | 990,000 | 1 | 0 | 0 | 5 | 0 | July, 1903 | 8 | 7 | 6 | 8 | 10 | 0 |
| Ferreira | 90,000 | 1 | 0 | 0 | 22 | 6 | Aug., 1904 | 20 | 15 | 0 | 21 | 5 | 0 |
| Geldenhuis | 200,000 | 1 | 0 | 0 | 7 | 0 | Aug., 1904 | 5 | 10 | 0 | 5 | 12 | 6 |
| Geduld | 400,000 | 1 | 0 | 0 | rts. | | Mar., 1902 | 6 | 12 | 6 | 6 | 15 | 0 |
| Henry Nourse | 125,000 | 1 | 0 | 0 | 8 | 0 | Aug., 1904 | 8 | 0 | 0 | 8 | 5 | 0 |
| Jubilee | 50,000 | 1 | 0 | 0 | 5 | 0 | Aug., 1904 | 4 | 12 | 6 | 4 | 17 | 6 |
| Jumpers | 100,000 | 1 | 0 | 0 | 2 | 6 | May, 1904 | 2 | 15 | 0 | 2 | 17 | 6 |
| Langlaagte | 470,000 | 1 | 0 | 0 | 2 | 0 | Aug., 1904 | 3 | 13 | 9 | 3 | 16 | 3 |
| May | 288,750 | 1 | 0 | 0 | 3 | 0 | Aug., 1904 | 4 | 0 | 0 | 4 | 2 | 6 |
| Meyer & Charlton | 100,000 | 1 | 0 | 0 | 5 | 0 | Aug., 1904 | 5 | 5 | 0 | 5 | 10 | 0 |
| Modderfontein | 290,000 | 1 | 0 | 0 | rts. | | Apr., 1902 | 9 | 7 | 6 | 9 | 10 | 0 |
| Namaqua | 94,331 | 2 | 0 | 0 | 3 | 0 | Dec., 1903 | 2 | 17 | 6 | 3 | 2 | 6 |
| New Jagersfontein | 200,000 | 5 | 0 | 0 | 15 | 0 | Oct., 1904 | 27 | 5 | 0 | 27 | 15 | 0 |
| New Primrose | 325,000 | 1 | 0 | 0 | 3 | 0 | Aug., 1904 | 3 | 11 | 3 | 3 | 13 | 9 |
| Rand | 1,795,956 | | 5 | 0 | 5 | 0 | Aug., 1902 | 10 | 12 | 6 | 10 | 13 | 9 |
| Robinson | 750,000 | 5 | 0 | 0 | 6 | 0 | Aug., 1904 | 9 | 10 | 0 | 9 | 15 | 0 |
| Robinson Deep | 950,000 | 1 | 0 | 0 | 3 | 0 | Aug., 1904 | 5 | 6 | 3 | 5 | 8 | 9 |
| Rose Deep | 425,000 | 1 | 0 | 0 | 3 | 0 | Aug., 1904 | 8 | 12 | 6 | 8 | 17 | 6 |
| Salisbury | 100,000 | 1 | 0 | 0 | 2 | 0 | Sept., 1904 | 1 | 15 | 0 | 2 | 0 | 0 |
| Village Main Reef | 400,000 | 1 | 0 | 0 | 4 | 0 | July, 1904 | 6 | 10 | 0 | 6 | 12 | 6 |
| Wemmer | 80,000 | 1 | 0 | 0 | 12 | 6 | July, 1904 | 10 | 10 | 0 | 11 | 0 | 0 |

*Ex-dividend.

## LONDON (By Cable).*

| Company. | Oct. 19 £ | s. | d. | Oct. 26 £ | s. | d. | Company. | Oct. 19 £ | s. | d. | Oct. 26 £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Camp Bird | 1 | 8 | 0 | 1 | 8 | 9 | Esperanza | | 18 | 1½ | | 17 | 6 |
| Con. Gold Fields | 6 | 13 | 9 | 7 | 1 | 3 | Modderfontein | 9 | 8 | 1½ | 10 | 0 | 0 |
| De Beers | 18 | 5 | 0 | 18 | 2 | 6 | Rand Mines | 10 | 12 | 6 | 10 | 15 | 0 |
| Dolores | 1 | 5 | 3 | 1 | 5 | 3 | Rio Tinto | 58 | 10 | 0 | 58 | 17 | 6 |
| East Rand | 8 | 6 | 10½ | 8 | 10 | 7½ | Simmer & Jack | 1 | 16 | 0 | 1 | 18 | 9 |
| El Oro | 1 | 0 | 0 | 1 | 1 | 10½ | Tomboy | 1 | 1 | 3 | 1 | 3 | 1½ |

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

## PARIS. Sept. 22.

| Company. | Location. | Capital Stock. Francs. | Par value. Fr. | Latest dividend. Fr. | Prices. Opening. Fr. | Prices. Closing. Fr. |
|---|---|---|---|---|---|---|
| Anzin, Coal | France | ... | ... | 290.00 | 5,725.00 | 5,710.00 |
| Boleo, c | Lower Cal. | 12,000,000 | 500 | 104.17 | 2,245.00 | 2,260.00 |
| Champ d'Or, g | S. Africa | 3,375,000 | 25 | 3.75 | 16.75 | 16.75 |
| Courrieres, Coal | France | 600,000 | 500 | 110.00 | 2,910.00 | 2,949.00 |
| Fraser River, g | Brit. Col | 250,000 | 25 | ... | 5.50 | 5.50 |
| Huanchaca, s | Bolivia | 40,000,000 | 125 | 2.50 | 92.75 | 93.75 |
| Laurium, z, l | Greece | 16,300,000 | 500 | 25.00 | 309.00 | 309.00 |
| Malfidano, z | Italy | 12,500,000 | 500 | 50.00 | 625.00 | 630.00 |
| Metaux, Cie. Fran. de | France | 25,000,000 | 500 | 22.50 | 510.00 | 505.00 |
| Mokta-el-Hadid, i, l | Algeria | 18,312,000 | 500 | 40.00 | 1,022.00 | 1,010.00 |
| Nickel, n | N. Caledonia | 15,000,000 | 250 | 22.50 | 639.00 | 610.00 |
| Penarroya, Coal | Spain | ... | 500 | 45.00 | 1,130.00 | 1,136.50 |
| Vielle Montagne, z | Belgium | 9,000,000 | 30 | 30.00 | 778.00 | 778.00 |

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.